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International Conference on Pesticides: Toxicity, Safety and Risk Assessment

A five-day International Conference on Pesticides: Toxicity, Safety and Risk Assessment was organized by the Industrial Toxicology Research Centre (ITRC), Lucknow, during 27 - 31 October 1985. The conference was sponsored by the Council of Scientific and Industrial Research and co-sponsored by the Department of Science and Technology, Section of Toxicology of the International Union of Pharmacology, Indian Academy of Neurosciences and the Society of Toxicology, India. Dr S. Varadarajan, Director General, CSIR and Secretary, Department of Scientific & Industrial Re-

search, inaugurated the conference; Prof. B.N. Sinha, President, National Academy of Medical Sciences (India), presided. Dr A.S. Paintal, Director, V.P. Chest Institute, Delhi, was chief guest to the inaugural function.

About 300 scientists from different parts of India and abroad, including UK, Canada, FRG and Switzerland, discussed the state of the art with reference to toxicology of pesticides in the global perspective and exchanged views on the subjects like model systems to study pesticides intoxication in animals and humans, residues of pesticides with reference to humans,

health and risk, education, safety measures, occupational workers engaged in pesticide handling, and pesticides in the context of phytotoxicology and ecotoxicology. More than 230 scientific papers were presented during eight oral and one poster sessions. Eminent experts from India and abroad delivered the invited lectures.

Inaugurating the conference Dr S. Varadarajan urged the scientists to develop indigenous technology for pesticides, which would suit to Indian conditions and which would be safe for man, animals, plants and environment. A large number of pests which developed resistance to pesticides were causing damage to crops. The target to achieve 250 million tonnes of food production by the end of the century, therefore, also depended on pesticides development programmes.

Referring to India's increasing population which had gone to 70 crores Dr Varadarajan said, "The country



At the inaugural session of the International Conference on Pesticides: Toxicity, Safety and Risk Assessment, seen on the dais (from right) are: Dr P.K. Ray, Director, ITRC; Dr S. Varadarajan, Director General, CSIR; Prof B.N. Sinha, President, National Academy of Medical Sciences, India; Prof A.S. Paintal, Director, V.P. Chest Institute, Delhi; Dr G. Thyagarajan, Director, Central Leather Research Institute, Madras; Dr (Smt.) S.V. Chandra, Assistant Director, ITRC; and Dr T.S.S. Dikshith, Organizing Secretary of the conference

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faces a big challenge in the field of food production and we are still lagging behind along with other developed countries". He cautioned the agriculturists and other consumers against the indiscriminate use of pesticides which was posing serious threat to the mankind and its environment. While in many western countries the use of pesticides had increased the yield per hectare, in India 80% of the pesticides used in fields was wasted in the environment as pollutant. He also expressed concern over the attitude of pesticides manufacturers who were not giving proper consideration to the safety of man and his environment.

Dr A.S. Paintal said that though the basic research on pesticides was being done, the knowledge regarding their proper utilization had not reached the people yet. Emphasizing the need for judicious application of pesticides and proper use of the existing information and expertise in the field of pesticides research, Dr Paintal suggested that the psychological aspect should also be studied.

Presiding over the function, Prof. B.N. Sinha said that documentation of the laws for regulating the manufacture, storage, transportation and the use of pesticides in various countries and modifying them to suit Indian conditions and then recommending to the regulatory authorities would minimize the time spent in evolving new laws.

In his welcome address, Dr P.K. Ray, Director, ITRC, said that there was no doubt in pesticides being the most desirable and useful tool of the agriculturists for protecting their crops from harmful pests and of the health agencies for controlling many vector borne diseases. However, indiscriminate use of pesticides posed a great threat to man and his environment by eliminating beneficial insects, causing an ecological imbalance, becoming phytotoxic, destroying useful plant species and entering into the food chain resulting in harmful effects to man and his ecological partners including aquatic

flora and fauna. Owing to lack of knowledge, information and appropriate training on the proper use of pesticides, workers in the manufacturing plants and the fields were getting exposed to the harmful effects of the pesticidal chemicals, resulting into a variety of health problems, he added.

Pointing out to the problem of safety of non-target species from the harmful effects of pesticides, Dr Ray suggested for reduced exposure to pesticides, use of biodegradable pesticides which did not accumulate in the food chain, and learning about the suitable antidotes to treat pesticide exposed victims successfully as some of the solutions to the existing problem. The development of naturally occurring biodegradable pesticides could lessen our sole dependence on synthetic pesticides, he added. He emphasized over the need for efforts towards the integrated biological control of pests. Workers should be properly informed and educated through proper training programmes regarding the possible known harmful effects of pesticides so that they could take due precautions during their occupational exposure to pesticides, he further said.

Delivering the key-note address, Dr G. Thyagarajan, Director, Central Leather Research Institute, Madras, said that the regulatory agencies have a focal responsibility in the selection of pesticides to be used and the manufacturing process to be adopted. Emphasizing over the need for reappraisal and a radically fresh thinking in the planning of chemical industry, Dr Thyagarajan said that alternative methods for the safer manufacture of all chemicals including pesticides should be considered in view of the increasing health hazards in their production. Research is really the stage where a strong foundation and culture of safety and risk consciousness should be aroused. Serious attention should be paid to the question of analytical methods and specifications for raw materials, intermediates and products.

Dr Thyagarajan further said that in the public interest, disclosure of all non commercial information such as toxicology of materials handled, precautions and steps to be taken in the event of any toxic emissions, should be made obligatory for the manufacturers and regulatory agencies. Setting up emergency preparedness facilities wherever applicable in cooperation with government authorities would be useful, he added. He hoped that government departments, international financing institutions, and technology transferring organizations would commit themselves to a safer way towards development.

Dr T.S.S. Dikshith, General Secretary of the Organizing Committee, referred to the problems of the developing world with particular reference to food, health, hygiene and indiscriminate use and improper storage of pesticides. A pragmatic approach to the problem of pesticides induced health hazards should be the primary concern in order to protect man and his environment, he observed.

The National Organic Chemicals India Ltd had instituted awards for presentation of papers. A panel of judges appointed by the organizing committee selected the papers for cash awards and merit certificates among the papers presented in the oral and poster sessions. The winners of the cash awards were: Dr Shelley Bhattacharya, Viswa Bharti University, Santi Niketan, Calcutta; Dr A. Sarkar, National Institute of Oceanography, Goa; and Dr F. Siddiqui, Ms N.F. Zaidi and Dr K. Kanan, ITRC.

On the concluding day a panel discussion was organized to take a stock of the state of the art in the field of pesticide research pertaining to toxicity safety and risk assessment. The following recommendations were made:

1. Conferences, seminars, workshops should be held at regular intervals to evaluate the problems in the field of pesticide related toxicity in man and animals.

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2. Emphasis should be given to determine ways and means to educate different sections of people (including the medical practitioners, farmers, and the workers in pesticide industries) regarding the precautionary measures that should be taken with respect to treatment to pesticide poisoning cases, detection of early signs and symptoms, and determination of any possible deleterious effect caused by pesticide.

3. Working groups should be formed for standardization of various toxicity tests related to pesticides in the mammalian system, aquatic flora and fauna and in different plant species. Extensive studies should be undertaken to standardize various tests for studying mutagenic, teratogenic and carcinogenic potential of various pesticides and these tests should be available at various centres all over the country.

4. For evaluation of phytotoxic potential of pesticides there is an urgent need for the development of a general protocol for the use of all concerned.

5. All India coordinated programmes should be initiated to involve different institutions in the country to carry out detailed investigation for determining the effect of agroclimatic conditions on the toxicity of various pesticides. This should be done after appropriate formation of various zones in the country.

6. Attempts should be made to develop *in vitro* predictive assays to determine possible pesticide related toxicity in the human system.

7. More facilities should be developed for undertaking studies on the occupational exposure effect of pesticides.

8. Attempts should be made to avoid wrong or improper use of pesticides in food production and/or preservation purposes.

9. Efforts should be made towards the development of short term tests which can predict long-term effects of pesticides, and for the development of chemical nematocides.

10. Effect of pesticides during growth

and development should be studied with greater emphasis.

11. Toxicological study of pesticides should involve protocols involving malnourished hosts and others who have been predisposed to conditions such as infection, high temperature and humidity.

12. Appropriate literature, audiovisuals should be developed as educational materials for informing all concerned regarding the procedure to use pesticides and the precautionary measures that should be taken during their use and disposal.

13. To evaluate the various toxic effects of pesticides, multicentric study needs to be carried out.

14. Chemical safety data during the manufacture of pesticide should be collected and made available to all concerned.

15. During the registration of pesticides by the registration authorities and during the declaration of a possible ban on the use of a particular pesticide, adequate attention should be given to determine the risk versus benefit ratio.

16. During manufacture of pesticides where highly toxic chemicals are to be utilized, all precautionary measures should be undertaken to store these chemicals only for a short period of time and to convert them immediately into relatively less harmful and less toxic pesticidal chemicals. Toxicity data of all chemicals used for pesticide manufacture and the therapeutic procedures to deal with any possible disaster should be made available to all concerned.

17. Any industry handling toxic chemicals should have disaster control unit attached to it. □

Papad press

The Central Food Technological Research Institute (CFTRI), Mysore, has developed a simple inexpensive pedal operated machine with which about 600 *papads* can be made from *dal* flour dough in one hour. Four *papads* of average size can be made at a time.

The thickness of the *papad* can be adjusted by altering the clearance between the discs provided in the machine. In comparison, only about 130 *papads* can be made in an hour by the traditional hand-rolling method. Even with the hand-operated press, not more than 170 *papads* can be made in an hour. The *papad* making operation normally involves two persons.

The new machine is suitable for making *papads* from horsegram which is rather hard and strenuous to roll by the traditional method. The prototype machine costs about three thousand rupees. □

Juice concentrate from Bangalore blue grapes

The Central Food Technological Research Institute, Mysore, has developed a process for concentrating the juice of the Bangalore blue grapes with a view to making a refreshing drink from these grapes with full flavour of the fruit.

Though there is a large production of these grapes, they are scarcely used for table purposes because of their high acidity. This acidity is removed in the CFTRI process, and full flavour of the fruit is retained in the product. □

Acryl soft binder

The Central Leather Research Institute, Madras, has developed a special type of acrylic binder 'acryl soft binder' meant for leather finishing. The binder yields films with very high cold crack resistance and minimum tackiness. The binder helps in obtaining extraordinary level of anchorage of the finishing materials to the leather surface. The user trials and demonstrations have shown that acryl soft binder developed by CLRI is a high performance product. □

Multi-purpose tanning agent

The Central Leather Research Institute, Madras, has developed a multi-purpose tanning agent called 'Alcrotan' which is a chromium-aluminium based synthetic

tanning agent. This product has no commercial equivalent in the international leather trade, and it affords leathers which are light-fast, full and soft. The colour-yield of the leathers tanned or retanned with Alcrotan is very high. The special feature of Alcrotan is in its high-exhaustability. □

Water-displacing rust-preventive oil for temporary corrosion protection

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a process for the preparation of water-displacing, rust-preventive oil for temporary corrosion protection. This formulation can be used in all metal finishing and engineering industries after pickling and phosphating, for temporary corrosion protection.

In normal practice, the components, after pickling, are rinsed in water and dried before the application of temporary corrosion preventive. It is generally observed that because of the time lag between drying and oiling, the components develop yellow rust stains on the surface which is not desirable for subsequent treatments. The formulation developed at CECRI eliminates the drying step and prevents the formation of yellow stains. In the new formulation, the rust-preventive oil displaces the water. The total capital outlay for a plant of capacity of 30,000 litres per annum is estimated at Rs 5.3 lakh.

Electron microscopy facilities at RSIC, Lucknow

The Department of Science and Technology-supported Regional Sophisticated Instrumentation Centre (RSIC) at the Central Drug Research Institute (CDRI), Lucknow, has acquired two electron microscopes:

1. *Transmission Electron Microscope (TEM)* 410 LS, Philips: Maximum accelerating voltage 100 kV, resolution 0.34 nm and maximum magnification 500,000 \times .

2. *Scanning Electron Microscope (SEM)* 515, Philips: Maximum accelerating voltage 30 kV, resolution 6.0 nm and maximum magnification 43,000 \times .

RSIC provides electron microscopy services, particularly for the ultrastructural studies of biological materials, to universities, research and development organizations, and industry on payment of a nominal charge. Facilities for the preparation of samples are also available. The details about the analytical facilities available at the Centre can be obtained from: The Head, RSIC, CDRI, Lucknow 226 001. □

New Building for Environmental Technology at CLRI

The enactment of pollution control laws in the country has forced all the industries to implement the same by putting up pollution control measures. The tanning industry being no exception to this is obliged to put up treatment plants for the effluents being discharged indiscriminately by the industry resulting in fast deterioration of the environment. Keeping in view the increasing demand from the tanning industry for necessary design and drawings for putting up these treatment plants a new building devoted to environmental technology with all the laboratory facilities (costing nearly Rs 9 lakh) has been constructed at the Central Leather Research Institute (CLRI), Madras. The new building was inaugurated by Shri Sanjay Sen, Chairman, Research Advisory Council, CLRI, on 17 October 1985.

In his inaugural address, Shri Sen stressed the need for controlling the pollution of the environment owing to tannery effluents and suggested that CLRI should take up time-bound projects to tackle this problem on a war footing.

Dr G. Thyagarajan, Director, CLRI, in his welcome address exhorted the tanning industry to implement pollution

control measures for the effluents being discharged without treatment. He hoped that with the facilities created by providing a new building for environmental technology the laboratory would be able to render better service to the tanning industry.

Dr W. Madhavakrishna, Scientist-in-charge of the environmental technology area, briefly explained the work being carried out in this laboratory since 1960. The development of low cost waste treatment methods in the laboratory encouraged the putting up of the full scale treatment plant at Ranipet for an effluent flow of four lakh litres per day by the tanning industry.

The laboratory was working, according to Dr Madhavakrishna, on a project sponsored by TALCO for putting up a common effluent treatment plant at Vaniyambadi for a cluster of about 70 tanneries. This is a Rs 20 million project.

LIDKAR has entrusted the laboratory with the task of providing designs and drawings for a common treatment plant to be put up for a group of tanneries at Kadugondanahalli near Bangalore.

Another full scale treatment plant was being put up at the tannery of the Wasan & Co. at Agra, U.P.

Tanneries in and around Madras were being regularly provided with consultancy services for putting up the treatment plants. □

Production of petroleum coke substitute from coal tar and allied substances

Shri Sudhir Kumar Mukherjee, Scientist, Central Fuel Research Institute (CFRI), Dhanbad, (presently at the Central Glass & Ceramic Research Institute, Calcutta, investigated the production of petroleum coke substitute from coal tar and allied substances. The study revealed that the specification grade petroleum coke substitute could be produced following the delayed coking technique from l.t. tar pitch and

coal hydrogenated residue under condition of slightly higher time or temperatures than that required for petroleum. The coking phenomenon could broadly be divided into two parts, viz. (i) coke forming reaction and (ii) volatilization. The coke forming reaction increased the yield of coke while the volatilization step contributed towards improvement of quality. The sequence of operation and the progress of reaction under coking conditions could be interpreted with the help of the degree of coking defined as $(BS + VM)/RC$ (BS-benzene solubles, VM=volatiles in BS free coke and RC=residual coke considered as green coke devoid of BS and VM). Accelerated ageing or air blowing of coker feeds prior to coking increased the yield of coke considerably and improved its property also. The blowing temperature of 240°C was found to be more or less limiting and independent of the nature of feeds.

It was inferred that the dehydrogenative polymerization under milder blowing conditions caused the formation of higher molecular weight asphaltenes which on coking gave higher yield of coke of improved quality compared to unblown feeds. Under severe blowing conditions the asphaltenes suffered degradation in molecular weight. On coking, this degraded product gave lower yield of coke affecting its quality also. Specification grade calcined petroleum coke substitute could be produced from the above mentioned coal based feeds at higher calcination temperature than that required for petroleum coke. Blowing of coker feeds prior to coking improved the yield and property not only of green coke but also of calcined coke, and also reduced the calcination temperature in comparison to unblown feed.

Shri Mukherjee carried out the work under guidance of Shri D.K. Mukherjee, Deputy Director, CFRI, and late Prof. C.N. Das of the Indian School of Mines, Dhanbad, and was awarded

Ph.D. degree in applied chemistry by the Indian School of Mines in 1985, for his thesis based on the study. □

Ecological and biochemical studies with special reference to pollution on selected species of molluscs

The intertidal region with rocky, sandy/muddy substratum provides excellent habitat for colonization of various species of molluscs. A number of such organisms are found in the bays, creeks and beaches along the coastline of the highly populated and industrialized city of Bombay. Increase in city population, urbanization, industrialization and discharge of various kinds of wastes into the bays and creeks without adequate treatment has resulted in the deterioration of the marine environment and aquatic life to a great extent. The animals inhabiting the intertidal zone are more susceptible to such hazards of marine environmental pollution. Taking this into consideration Smt. L. Krishna Kumari of the National Institute of Oceanography, carried out a detailed and comparative study of the ecological and biochemical aspects of three species of molluscs, viz. *Crassostrea Cucullata* (*Saccostrea cucullata*), *Cerithium rubus* and *Tellina angulata* from polluted and relatively unpolluted regions along the coastline of Bombay.

The studies divulged well-defined differences in the physicochemical parameters between polluted and relatively unpolluted areas. The polluted areas were characterized by relatively lower values of dissolved oxygen, higher levels of BOD, nitrate and phosphate, slightly low pH values and wider fluctuations in salinity. Concomitant with the environmental variability, well marked differences were observed in the growth rate, condition index, biochemical components and the degree of accumulation of metals in all the three species of molluscs. The magnitude of accumulation of metals by

these molluscs supported their significance as indicators of pollution.

The present evaluation of molluscs living under different environmental conditions has provided basic knowledge regarding the impact of pollution on size, growth, breeding habits, various biochemical constituents of and selected metals concentration in *C. cucullata*, *C. rubus* and *T. angulata*.

Smt. Krishna Kumari carried out these studies under the guidance of Dr (Smt) Vijayalekshmi R. Nair of the NIO Regional Centre, Bombay, and was awarded Ph.D. degree by the University of Bombay for her thesis based on these studies. □

NEW PUBLICATIONS

Status of Rock Mechanics Research in Tunnels in India

In a short span of sixteen years, the Central Mining Research Station (CMRS), Dhanbad, has tackled major rock mechanics problems in a number of river valley projects all over the country. CMRS is now well equipped to follow the rock mass behaviour, tunnel deformation and support pressures. A number of new approaches have also been evolved and the studies are proving useful in selecting proper tunnel alignments and optimizing support requirements.

For example, the institute, at the request of hydel project authorities, conducted investigations at the Yamuna and Giri Hydel projects on the problems of rock mechanics evolved during tunnelling with a view to finding out possible solution to the problems.

CMRS expertise in the field has earned the recognition of World Bank. The present publication highlights the R&D activities in the field under the following heads: Rock mass behaviour and rock pressure; Methods of predicting rock pressure - a global survey; Experiences of CMRS; Observational approach of CMRS; Achievements of CMRS; Practical utility and Future programme.

Enquiries pertaining to the publication may be addressed to the Director, CMRS, Dhanbad. □

First national meet of electrochemistry students

The Central Electrochemical Research Institute, Karaikudi, in collaboration with the Society for the Advancement of Electrochemical Science and Technology (SAEST), Karaikudi, organized the First National Meet of Electrochemistry Students during 1-4 December 1985. Fifty-five students of electrochemistry from different universities in India and 14 students of the post-graduate course in industrial electrochemistry, Alagappa University, Karaikudi, participated in this meet.

The students were exposed to the latest developments in all aspects of electrochemical science and technology by way of lectures by the heads of various divisions of the institute. In addition, experts in electrochemistry from other organizations were also invited to deliver specialized lectures.

The students visited the various laboratories of the institute and received practical training in the areas of their interest. □

CONFERENCE BRIEFS

Geohydrology Project Planning Meeting of African Countries

The Geohydrology Project Planning Meeting for African Countries was held during 8-14 November 1985 in the premises of the Geological Survey of Botswana at Lobatse, Botswana. The meeting, which was sponsored by the Commonwealth Science Council, intended to evolve projects and operational methodology for groundwater development in drought-prone areas in various African Countries. Dr C.P. Gupta of the National Geophysical Research Institute, Hyderabad, participated as the Resource Person from India. Other three resource persons were from UK, Canada and Cyprus. Representatives from Kenya, Ghana, Malawi, Nigeria, Sierra Leone, Swaziland, Tanzania, Zambia, Zimbabwe and

Botswana, attended the meeting. Each representative presented papers related to problems and status of R&D in his respective country. Dr C.P. Gupta presented an overview and the state-of-art paper on groundwater exploration and management. He identified some important R&D programmes which should be undertaken to mitigate the problems arising owing to droughts and groundwater pollution. These suggestions included: (i) Evolution of more potential techniques for siting borewells in different geological environs particularly in hard rock terrains for delineation of fractures, (ii) Studies on the mechanism and magnitude of recharge into aquifers, (iii) Evolution of appropriate methodologies to treat chemically and bacteriologically polluted water, and (iv) Development of suitable methods for a planned conjunctive use of groundwater and surface water resources.

Three working groups were constituted to evolve specific strategies for augmenting groundwater resources, which deliberated on various aspects of geohydrology. Dr Gupta chaired the group on groundwater data collection and resource management. Some of the salient recommendations made by the group headed by Dr Gupta are: Establishment of centralized geohydrologic data banks in each country; Organization of training courses for middle level technical personnel and technicians; Enactment of legislation covering various aspects of groundwater management; Evolution of specific measures for the enhancement of recharge to aquifers through specially designed experiments; Undertaking integrated pilot projects in drought-prone areas for assessment and optimal utilization of groundwater resources; and Organization of appropriate mechanism for intra-regional exchange of information and resource management.

A detailed report was submitted to the Commonwealth Science Council which was expected to raise funds for implementation of the suggestions.

International Seminar on Case Studies in Transfer of Technology

Dr J.C. Srivastava, Joint Adviser, Technology Utilisation Division, CSIR, attended the title seminar held at Trinity College, Dublin, Ireland, during 25-28 September 1985. The seminar was organized by the Institution of Engineers of Ireland and sponsored by European Industry Commission, World Federation of Engineering Organizations, Commission on Transfer of Appropriate Technology and UNESCO, UNIDO and UNCHS (UN Centre for Human Settlement). The seminar was inaugurated by Dr Patrick Hillery, President of Ireland.

The aim of the seminar was to exchange experience in transfer of technologies based on actual case studies. The focus was on harnessing technologies readily available and applicable for the alleviation of the poverty and hunger in developing countries. Twenty-seven countries, 5 international organizations and 3 UN agencies participated in the seminar. Sixty-three papers on five topics were presented: Low-cost housing (17), food (10), energy (17), water (12) and general (7). Some of the significant presentations were: Appropriate technology in water and waste treatment in developing countries (Ireland); A rural housing project in Tanzania (Tanzania); Research on local technologies improvement (Tunisia); Sanitation : experiences in Bangladesh (Ireland); Some specific problems of food industry development in developing countries (UNIDO); Development and protection of fish protein concentrate (Pakistan); Energy management education for developing countries (USA); Ground source heat pump (Ireland); Water resources management in Jordan (Jordan); Information problems in transfer of technology (Hungary); Industrial technology transfer in Portugal; and Pilot biogas plant (Jamaica).

Dr Srivastava presented the following four case studies: (1) Food - Ready to eat

supplementary food for combating malnutrition among rural children; (2) Water - Deepwater handpump (India Mark II) for meeting rural water supply needs; (3) Housing - Liveable and durable mud houses in rural India; and (4) Energy - Improved firewood based mud cookstove for rural homes.

Another Indian participant, Shri P.L. Chanana of the Bharat Heavy Electricals Ltd, New Delhi, made his presentation on the contributions of BHEL in the energy sector. Dr H.C. Visvesvarya, Director General, Cement Research Institute, New Delhi, participated in the seminar as a UNIDO-sponsored participant and spoke on the energy conservation in cement industry.

Literature of CSIR, CART, DNES and NBO(CBRI technologies) was displayed during the seminar. □

TRAINING COURSES

Industrial Analysis (Electro-analytical Techniques)

The Central Electrochemical Research Institute, Karaikudi, organized a course on 'Industrial Analysis' from 4 November to 3 December 1985. The course material covered the following parts: Classical methods, Electrochemical sensors, Polarographic methods and Voltammetric methods. Twenty-three persons from various organizations participated in the course.

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Corrosion and Its Prevention

The Central Electrochemical Research Institute, Karaikudi, organized a condensed course on 'Corrosion and its prevention' from 9 to 14 December 1985. Nineteen persons from different organizations participated in the course. □

EXTRAMURAL RESEARCH

Synthesis and biological activities of some substituted sydnones and sydnone-imines

Amongst the mesoionic heterocycles, sydnones and sydnone-imines are reported to exhibit various biological activities. Shri S.V. Badachikar, a CSIR research fellow, while working in the

Chemistry Department of the Karnatak University, Dharwad, prepared sydnones and sydnone-imines with biologically active moieties like thiazoles, thioureas, acetamido groups and sulphonamide and sulphonate groups with a view to obtaining compounds with enhanced biological activities. In the first instance sydnonylthiazolo-2-aminothioureas were synthesized and subjected to antiinflammatory, analgesic and antibacterial testings. For this purpose various sydnones were acetylated using acetic acid and phosphorous pentoxide in refluxing benzene to yield 4-acylsydnones. These acylsydnones were brominated and the bromoacyl sydnones were treated with alkyl and aryl isothiocyanates to yield 4(4'-substituted) thiazolo-2-aminothioureas. They showed promising antiinflammatory analgesic and antibacterial activities.

Next, various 4-bromoacylsydnones mentioned above were treated with N-substituted-N'-benzoylthioureas to yield different dialkyl/diaryl-2-aminoacylthiazoles. These were subjected to antiinflammatory analgesic and antibacterial tests, and some of these showed promising activities.

In view of the importance of an amide bond in the local anesthetics, the synthesis of sydnones with an acetamido group in the phenyl nucleus of the 3-phenylsydnone was attempted. Starting from *p*-nitrobenzoylchloride and treating it with secondary amines the corresponding amides were obtained. The nitro group was reduced to yield the amines. These amines were converted into sydnones by the well established methods. The sydnones were treated with dimethyl acetylenedicarboxylate and dibenzoylacetylene to produce the corresponding pyrazolyl derivatives. The sydnones and the corresponding pyrazoles were subjected to antibacterial screening and some of them showed activity comparable to that of the standards.

Taking into consideration the importance of sulphonamido and sulphonate

groups in the phenyl as well as in the sydnone ring, various *p*-substituted phenyl sydnones and sydnone imines were synthesized. Starting from acetanilide and carrying out chlorosulphonation, *p*-acetamidobenzenesulphonyl chloride was obtained. This on treatment with various phenols yielded phenylsulphonate derivatives which on hydrolysis gave the necessary amines. These amines were converted into the corresponding acetonitriles which on nitrosation and dehydration produced the desired sydnone-imine hydrochlorides. The acetonitriles on hydrolysis produced glycines which could be converted into the corresponding sydnones. The sydnones and sydnone-imine were subjected to antibacterial activity and some of these showed promising activity.

Since, bis-sydnones are interesting from the point of view of their biological properties and also as intermediates in the synthesis of long chain compounds, their synthesis was attempted. Starting from 4,4'-diaminodiphenylmethane and following the usual procedure, bis-sydnones were prepared and subjected to usual reactions and were screened for antibacterial activity.

Shri Badachikar worked under the guidance of Dr G.S. Puranik of the department.

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Crystal structure of two isomers of dichlorobis (tolylazopyridine) osmium (II)

Smt. Anuradha Mukhopadhyay, a CSIR research fellow, while working at the Department of Magnetism, Indian Association for the Cultivation of Science, Calcutta, investigated the crystal structure of two isomers of dichlorobis (tolylazopyridine) osmium (II). One of the isomers was supposed to have a 2-fold axis in the complex (the C_2 -isomer) while the other had no such symmetry (the C_1 -isomer). The space group of the C_2 -isomer (monoclinic) was determined photographically to be $P2_1/c$. Cell parameters, obtained from diffractometric measurements, were $a = 8.035(2)$, $b = 24.176(4)$, $c = 13.416(5)$

$\beta = 114.34(3)^\circ$; $z = 4.3326$. Reflections [$I > 2\sigma(I)$] were observed by diffractometry. Position of Os was determined from a 3-dimensional Patterson map. The other atoms in the asymmetric unit were located by successive Fourier syntheses. The structure thus obtained was refined by the least-squares method and the refinement converged, with all the H atoms (except those belonging to the CH_3 group) kept fixed at their calculated positions, to $R = 0.026$, with a quality of fit parameter $S = 1.017$.

The results indicated that considering the coordinating pairs of Cl, N(pyridine) and N(azo), in that order, the C_2 -isomer has a *cis-trans-cis* configuration. A shortness of the Os-N(azo) bond, compared to the Os-N(pyridine) bond was also revealed, indicating a considerable π -backbonding power of the azo function making the net ($\sigma + \pi$) bond order larger in the former. This was corroborated by a lengthening of the N-N distance in the azo group.

The space group of the C_1 -isomer (triclinic) was found to be $P\bar{1}$. The cell parameters obtained from diffractometric measurements were: $a = 8.593(7)$, $b = 10.78(1)$, $c = 13.52(1)\text{\AA}$, $\alpha = 79.10(8)^\circ$, $\beta = 91.69(7)^\circ$, $\gamma = 78.74(7)^\circ$; $z = 2.2884$. Reflections [$I > 3\sigma(I)$] were observed by diffractometry. Position of Os was determined from a 3-dimensional Patterson map. The other atoms in the asymmetric unit were located by successive Fourier syntheses. The structure thus obtained, with all the H-atoms (except those belonging to the CH_3 group) fixed at their calculated positions, refined to $R = 0.044$ with a quality of fit parameter $S = 1.004$. The complex was confirmed to be the *cis-cis-cis* isomer. Characteristics of the bonds involving N were found to be similar as observed in the C_2 -isomer.

In addition to the above detailed structure analyses the researcher made the preliminary crystallographic study on the following organic compounds: (1) $\text{C}_{16}\text{H}_{21}\text{O}_2\text{N}$ - Two polymorphic varieties of the compound were detected.

One of these is triclinic (space group $P1$ or $P\bar{1}$), and the other, monoclinic (space group $P2_1/c$); (2) $\text{C}_{18}\text{H}_{20}\text{O}_4$ - Crystals of this compound were also found to grow in two varieties: one orthorhombic (space group Pbcm or $\text{Pca}2_1$) and the other monoclinic (space group $P2_1$); (3) $\text{C}_{23}\text{H}_{20}\text{O}_2$ - The space group was found to be $P2_1$. \square

PERSONNEL NEWS

Appointments/Promotions

Dr R. Selvarangan

Dr R. Selvarangan of the Central Leather Research Institute, Madras, who was earlier promoted as Scientist F on *ad hoc* basis (27 Sep. 1982) has now



been promoted on assessment as Scientist F (22 Aug. 1983). For scientific attainments of Dr Selvarangan, see *CSIR News*, 32 (1982) 175. \square

Dr K. Thomas Joseph

Dr K. Thomas Joseph, Head, Polymer Division, Central Leather Research Institute (CLRI), Madras, has been promoted on assessment, as Scientist F at the institute with effect from 22 August 1984.

Dr Thomas Joseph (born 9 July 1931) obtained his M.Sc. degree from the Birla College, Pilani, in 1954 and Ph.D. degree from the Rajasthan University in 1959; the title of his Ph.D. thesis being 'Studies on skin and hide proteins'.

Starting his career with CLRI in 1955, he held the position of Scientist EII since 1979. He went to Germany on an exchange fellowship (1964-65) for carrying out research in the field of collagen at the Max Planck Institute in

Munich, FRG. At CLRI, Dr Joseph has been responsible for building a polymer and biopolymer division, which over the years has become the biggest group in this laboratory. In the last 31 years he has made contributions in the area of biochemistry of collagen and connective tissue proteins, polymer chemistry, slaughter house byproducts and leather



chemistry. He has published over 150 research papers and reviews in international journals.

Dr Joseph's researches have been quoted in over ten books, published recently, besides a number of critical reviews. The programme of grafting of polymers on hides, skins and leathers, which he has pioneered at this institute, beginning in 1966, has been replicated in a number of institutions over the years, and during the past few years or so the number of such institutions has increased. This has helped in improving the quality of hides and skins to a great extent and has ensured better returns through improvement in the quality of finished leather. It may be mentioned that CLRI was the first to take up this problem and to succeed in achieving the grafting.

For the last 10 years, Dr Joseph has been working in multidisciplinary areas. He has been associated with the development of a number of polymeric products for the leather industry, and biomaterials based on collagen. The truly interdisciplinary nature of the work carried out by his team is borne out by the fact that as many as 12 workers have taken their doctorate degrees in the fields of biochemistry/

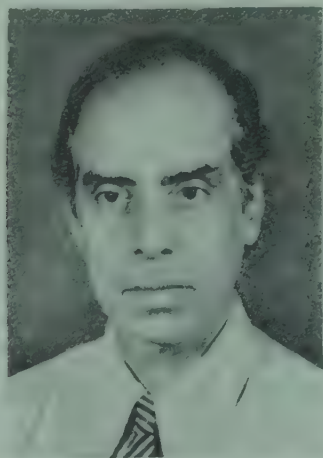
chemistry/technology/veterinary science under his guidance. He is a recognized Ph.D. guide of the Madras University and is associated with a number of many other universities and academic institutions, serving them in various capacities like chairman and member, board of studies and examiner for Ph.D. theses.

* * *

At the Central Electrochemical Research Institute (CECRI), Karaikudi, Shri R. Srinivasan, Dr P.B. Mathur and Dr V.K. Venkatesan have been promoted, on assessment, as Scientists F; Shri Srinivasan from 1 February 1985 and Dr Mathur and Dr Venkatesan from 1 October 1985. Brief profiles of the promotees:

Shri R. Srinivasan

Shri Srinivasan (born 18 Nov. 1927) graduated in Chemistry in 1947 and in Chemical Engineering in 1949. He had his post-graduate training for one year in the University of Toronto, Canada, in process metallurgy.



Shri Srinivasan's professional experience of 33 years is the outcome of working in an electrochemical industry, a brief tenure in the A.C. College of Technology, Madras and a long career in R&D at CECRI where he has been working since April 1954. His fields of interest are: electrometallurgy, electrosynthesis of inorganic chemicals and research management.

Shri Srinivasan has over the last three decades built up a good base for R&D in

the field of electrohydro-metallurgy in CECRI wherefrom important contributions have come up. Noteworthy among them are: a Rs6 million electrolytic chromium plant in Rourkela, a silver refinery at Madras for recycling scrap from reject material, and an iron powder plant. A proving plant for the extraction of gallium, a metal of far reaching importance in the semiconductor industry, is coming up at the Madras Aluminium Co. (MALCO), Mettur Dam, Tamil Nadu. Electrowinning and refining of zinc, copper, lead and antimony as well as electrolytic metal powders are the other activities in which the capabilities built up in CECRI by the dedicated efforts of Shri Srinivasan and his colleagues are sought after by many in the country. Winner of an I.P.B. award for the process on iron powder, Shri Srinivasan has made noteworthy contributions in the field of electro-inorganic chemicals also, particularly on innovative processes for persulphates and manganese dioxide.

A well-known figure in the field of electrometallurgy in India, Shri Srinivasan has been serving many professional bodies and institutions like ISI, PMAI, SAEST and I.I.Ch.E. with distinction.

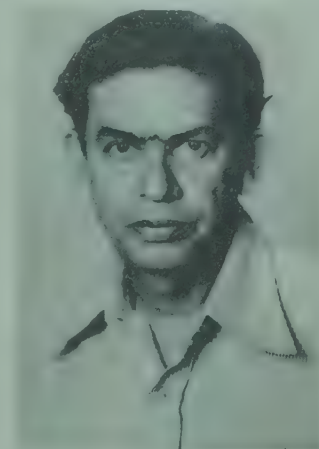
Also, Shri Srinivasan has been responsible for the organization of research planning and monitoring activities in CECRI.

Dr P.B. Mathur

Dr Mathur got his education at the Allahabad University, and obtained his Ph.D. degree in 1956. After serving for one year at the Birla College, Pilani, as Assistant Professor, he joined CECRI in December 1958 as Senior Scientific Officer (Gr II) and was promoted as Scientist E in March 1966.

At CECRI, Dr Mathur has been engaged in various branches of electrochemistry and is presently the coordinating head of the Division of Batteries and Power Sources. He has published over 115 research papers and

review articles in reputed international journals and taken 33 patents in India and abroad.



Dr Mathur has developed a number of products and processes of high commercial utility and strategic importance for the Defence, India Meteorological Department and other agencies. A number of his processes such as the one related to detinning have been commercialized. Dr Mathur has advanced about a dozen theories on various intricate phenomena of nature such as on periodic precipitation, diffusion, chromatography, chemical and photochemical kinetics and periodic table. Several of these theories have been internationally recognized. Dr Mathur visited USA in 1971 under the Scientist-Exchange Programme between the two countries.

Dr V.K. Venkatesan

Dr Venkatesan (born 16 May 1933) did his B.Sc. (Hons) and M.Sc. (by research) from the Annamalai University in 1954 and 1956 respectively. He obtained his Ph.D. degree in electrochemistry from the Moscow State University in 1966. His Ph.D. work was on the mechanism of influence of adsorption of organic substance on electroreduction of anions and cations.

After a brief service in the Annamalai University, he joined CECRI in July 1957. His earlier work was concerned with the electrical conductance and viscosity of highly concentrated electrolyte solutions up to saturation. He

has been a co-investigator in developing a new concept of concentration termed as 'concentration potential', based on internal pressure of solution, and also



an empirical equation for the variation of electrical conductance and viscosity as a function of concentration-potential, which work has been quoted in several books and reviews.

At CECRI, his work relates to electrical double layer with particular reference to adsorption of organic compounds at metal/solution interface. He along with his coworkers has discussed the existence of polarographic maxima of third kind for the first time (the terminology was given by the Academician (late) Prof. A.N. Frumkin). He has also worked on electrocatalysis of hydrogen-oxygen electrode reactions with the objective of developing electro-catalysts for use in the alkaline hydrogen-oxygen fuel cells. Presently, he is the Coordinating Head of the Electrochemical Materials Science which is concerned with the development of newer materials for electrochemical processes of industrial importance, photoelectrochemical and photovoltaic cells, luminescent phosphors and solid electrolytes for power sources and ionic sensors. He is coordinating the work on development of alkaline hydrogen-oxygen fuel cells (AFC) and phosphoric acid fuel cells (PAFC). A number of AFC modules have been successfully tested. The development of electrocatalysis for the hydrogen and oxygen electrode reactions is being tried for the use of

hydrogen evolution/oxygen depolarized cathode in chlor-alkali cells.

In addition to USSR, he has visited UK in 1974 and FRG in 1984.

He has published a large number of papers. In addition, he is a co-author of a chapter on 'Electrochemistry of Niobium and Tantalum' in the Encyclopaedia of the Electrochemistry edited by A.J. Bard; contributor of a chapter on 'Classified bibliography' in one of the 10 volumes of '*Comprehensive Treatise on Electrochemistry*' edited by R.E. White, J.O'M Bockris, B.E. Conway and E. Yeager (vol. 8, Plenum Press, NY 1984); a co-author of a chapter on 'Oxidation Reduction Potentials of Niobium and Tantalum' in the volume edited by A.J. Bard, R. Parsons and J. Jordan, Marcel Dekker, Inc., New York (1985).

He has served as member of Board of Studies for Chemistry of the Bharathiar and Bharathidasan universities. He is a recognized guide for Ph.D. of a number of universities in India.

* * *

Shri S.R. Natarajan

Shri S.R. Natarajan of the Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted, on assessment, as Scientist EI (1 Jan. 1985). Shri Natarajan had a consistently good academic record right from his school days and took his M.A. degree in Chemistry from the Annamalai University. He has been with CSIR for more than 27 years, firstly as a member of staff of the then Publications Directorate, New Delhi, associated with the production of *The Wealth of India*—A dictionary of raw materials, and since 1960, with CECRI where he has been actively associated with investigations in and relating to deposition of metals and alloys, chemical and instrumental analysis of plating solutions and electrodeposits, and electrolytic and chemical stripping of defective deposits. In addition to this he has been offering technical advice to industries and other organizations, and has been conducting

refresher courses in electroplating and metal finishing. He is at present pursuing a project scheme on plating of precious metals and other alloys. He is a fellow member of the Society for the Advancement of Electrochemical Science and Technology, Karaikudi; and a member of ISI committees on electroplating and metal finishing. He has forty research/review papers to his credit.

* * *

At the Indian Institute of Petroleum, Dehra Dun, the following have been promoted, on assessment, as Scientists/Engineers EI with effect from the dates given in parentheses: Shri P.C. Gupta (15 June 1982), Shri R.K. Sharma (3 Oct. 1982), Dr Dinesh Chandra, Shri Mohd. Anwar, Shri V.K. Kapoor, Dr A.K. Gupta (all the four from 7 Dec. 1982), Shri G.C. Srivastava (16 Dec. 1982), Shri Pradeep Kumar, Dr M.L. Sagu (both from 17 Jan. 1983), Shri Jai Prakash (19 Jan. 1983) and Dr A.V. Ramaswamy (2 Feb. 1983).

* * *

Shri N.N. Guha has been appointed Scientist C in the Regional Centre for Development (Central Leather Research Institute), Calcutta (14 Oct. 1985).

* * *

At the Structural Engineering Research Centre, Madras, the following personnel have been promoted as Scientists EI, on assessment, with effect from the dates given in parentheses: Shri K.S. Shankarpureswaran (28 Sep. 1983), and Shri K. Mani and H.G. Sreenath (both from 3 Jan. 1985)

Transfers

Shri D. Muralidharan, Scientist B, has joined the Central Leather Research Institute, Madras, on transfer from the Regional Research Laboratory, Hyderabad (11 Oct. 1985).

Resignations

Dr V. Krishnamurthy, Scientist C, Central Leather Research Institute, Madras, has resigned (6 Dec. 1985). □

Shri Omesh Saigal appointed Joint Secretary (Admn.), CSIR

Shri Omesh Saigal, IAS, has been appointed Joint Secretary (Administration), CSIR, (10 Jan. 1986).

Shri Saigal (born 29 March 1941, Simla) did his B.Tech. (Hons) from the



Indian Institute of Technology, Kharagpur, in 1962, and was selected in IAS in 1964. Shri Saigal has held several important posts such as: President, New Delhi Municipal Committee; Chairman & Managing Director of a number of undertakings; and Secretary, Finance, Planning & Taxation, Delhi Administration. He has written several novels in Hindi and English and has directed two short films: 'Everlasting Now' and 'Eternal Moments'. □

ANNOUNCEMENTS

International Seminars on Frontier Areas

Three international seminars on frontier Areas (ISOFA-I, II, III) will be held at Jorhat, during 1986-87 to commemorate the silver jubilee year of the establishment of Regional Research Laboratory, Jorhat.

Keeping in tune with the multidisciplinary nature of R&D inputs from the laboratory, following topical areas will be covered in ISOFA-I, II, III.

ISOFA-I: 31 March-5 April 1986
Applied chemical & engineering sciences (chemical reaction engineering, FBC (coal), pulp and paper technology, oil field chemicals and advances in analytical chemistry).

ISOFA-II: 27-30 October 1986 — *Bio & chemical sciences* (natural products, organic synthesis, medicinal and economic plants and biochemistry).

ISOFA-III: 11-13 February 1987 — *Physical & engineering sciences* (geoscience, applied civil engineering and mechanical engineering).

Eminent Indian and foreign scientists have consented to participate in the seminars. Presentation of research papers in the above seminars is by invitation only. Further details can be had from: Dr K.V. Raghavan, Co-ordinator, ISOFA, RRL, Jorhat 785 006.

* * *

Course on Computer Aided Analysis of Structures

An intensive course on 'Computer Aided Analysis of Structures' is proposed to be conducted by the Structural Engineering Research Centre, Madras, during 3-7 March 1986. The objectives of this course are: (i) to expose practising engineers to the use of on-line computing systems, (ii) to acquaint them with the development of software for structural engineering applications, and to demonstrate the use of these programs for a better understanding of their potential.

The course is open to senior engineers and research scientists of consulting and construction firms in the public and private sectors and academic and research institutions, engaged in research, development, and application of computers in structural engineering. The contents of the course have been so planned that prior knowledge of computer programming is not necessary. Further, the development of programs with a limited number of hands-on sessions is envisaged so that at the end of the course the participant is fully equipped to meet any computing environment. Some of the topics to be covered in the course are: Basics, static analysis, dynamic analysis, nonlinear analysis, CAD and synthesis. The hands-on sessions will occupy about 30% of the course timing so that the

participant gets full benefit of executing what he has learnt during the lecture hours. SERC has a PRIME 750 computer with interactive graphics facility and a number of 16-bit and 8-bit microprocessors.

The fee for the course is: Rs 1200 for each participant from India and \$ 300 for each participant from abroad. (The fee includes the cost of the course material, lunch, and refreshments during the course period.)

Further details regarding the course can be had from Dr A. Rajaraman/Shri C.V. Vaidyanathan, Course Co-ordinator, SERC, CSIR Campus, Taramani, Madras 600 113.

* * *

Second Training Course on Water Desalination — change in dates

The Second Training Course in Water Desalination scheduled to be commenced from 13 January 1986 at the Central Salt & Marine Chemicals Research Institute, Bhavnagar [CSIR News 35 (1985) 176] will now be conducted during 10-14 February 1986. The course is being conducted for the benefit of public health and environmental engineers nominated by the state governments. □

PATENTS FILED

267/DEL/85: A device for obtaining NMR spectra in undeuteriated solvents on FT (Fourier transform) instruments, K.G. Deshpande — National Chemical Laboratory, Pune.

279/DEL/85: Process for conversion of methanol to olefins, P. Ratnasamy, I. Balakrishnan, Rajiv Kumar & S.G. Hegde — National Chemical Laboratory, Pune.

430/DEL/85: New delivery system with different kinds of novel dispensers for controlled release of aquatic larvicides, R.N. Sharma, H.G. Vartak, (Km.) P.K. Gund, I.V. Bhaladar, J.V. Rao, V.K. Powar & R.B. Mitra — National Chemical Laboratory, Pune. □

NOMINATIONS INVITED

Shanti Swarup Bhatnagar Prizes
in Science and Technology
for 1986

Nominations are invited by the Council of Scientific & Industrial Research for the Shanti Swarup Bhatnagar Prizes in science, including engineering and technology, for 1986. The prizes are to be given for research contributions made primarily in India during the past five years. The upper age limit of nominees for the prize is 45 years.

Five or more prizes, each of the value of Rs 20,000, may be awarded annually for notable and outstanding research, applied or fundamental, in the following disciplines: (1) physical sciences, (2) chemical sciences, (3) biological sciences, (4) engineering sciences, (5) medical sciences, (6) mathematical sciences, and (7) other sciences.

Those who can make nominations include: presidents of approved scientific societies of all India character, vice chancellors of universities, deans of science, engineering and technology and medical faculties; directors of Indian Institutes of Technology, deans of faculties and heads of institutions deemed to be of university status, director generals of major R&D organizations such as the Defence Research & Development Organisation, Indian Council of Medical Research, Indian Council of Agricultural Research, India Meteorological Department; Chairmen of Atomic Energy Commission, Electronics and Space commissions, Oil & Natural Gas Commission, Science Advisory Committee to the Cabinet, etc., directors of CSIR laboratories, Bhabha Atomic Research Centre, Tata Institute of Fundamental Research, Physical Research Laboratory, Indian Association for the Cultivation of Science, etc. and Secretaries of the Department of Environment, Department of Science and Technology, Department of Electronics, Member-in-charge of Science

Planning Commission and the Bhatnagar prize winners. University faculties should recommend persons working in their institutions only and route the nominations through their respective vice chancellors, while the faculties in IITs should send their nominations through their directors. Directors of CSIR laboratories can nominate a candidate in the discipline of their interest, irrespective of whether they are working in CSIR or outside. Each Bhatnagar prize-winner can send the nomination of one person for each year's award in his own discipline only. Each such nomination shall give a detailed statement of work and attainments of the nominee, and a critical assessment report (in not more than 500 words) bringing out the importance of the significant contributions of the nominee made during the past five years. Nominations from individuals sponsoring their own names or of others will not be accepted.

Nominations may be sent by registered (acknowledgement due) post along with 15 copies of detailed statements of work and attainments of each nominee and the discipline under which the nominee is to be considered. The attainments of the nominee during the past five years may be highlighted, and sent along with at least one set of reprints of papers published during the 5-year period. Nominations signed by the sponsors should be sent, marked 'confidential', to the Deputy Adviser, Extramural Research, CSIR, Rafi Marg, New Delhi 110 001 and should reach CSIR by 31 March 1986. Regulations governing the prize and the proforma for nomination may be obtained from the above address. □

COUNCIL OF SCIENTIFIC
& INDUSTRIAL RESEARCH

Advertisement No. 7/85

EDITOR-IN-CHIEF: PID

The Council proposes to appoint an Editor-in-Chief for the Publications and Information Directorate (PID), New Delhi. The main function

of PID is the collection and dissemination of information in regard to significant and original R&D work. The current activities of PID include (i) publication of scientific and technical literature—(a) journals and bulletins in various disciplines of science and technology (b) encyclopaedia (*The Wealth of India*), monographs and miscellaneous publications, and (c) newsletter, reviews and handbooks on CSIR activities; (ii) publication of technical literature in Hindi and popular science magazines in English, Hindi and Urdu; (iii) providing scientific and technical information services; and (iv) organizing courses in science editing and technical writing.

Job requirements: It is a senior level post in the editorial field related to science & technology. The duties involve (a) overall charge of editing and production of scientific and technical journals both of technical and popular nature published by CSIR (b) building up the background information for the publication of *The Wealth of India* series; and (c) publication of monographs, reports of seminars and conferences and other scientific and technical literature.

Qualification and Experience: High level qualification in Science/Technology, proven excellence in science writing and experience of editorial work of scientific journals of high standard. Experience at senior level in the area of management of publication and production and circulation is desirable.

Salary/Conditions of Service: The scale of pay attached to this post is Rs 2250-125/2-2500-EB-125/2-2750 plus allowances as admissible under central government rules. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed. Consultancy subject to an upper limit of Rs 15,000 per annum is permissible. Free medical aid and leave travel concession are also permissible for the family as per government rules. Residential accommodation will be provided on payment of usual rent subject to availability.

Age: Preferably below 50 years, relaxable in deserving cases.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the selection committee. The decision of the Council in this behalf will be final. Applications from employees working in government departments, public sector organizations and government funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within three months of receipt of the appointment orders.

Those interested may kindly send their curriculum vitae in duplicate in the form obtainable from the Joint Secretary (Admn.), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110 001, on or before 28 February 1986. Any information about PID can be obtained on request from this address. □



CSIR NEWS

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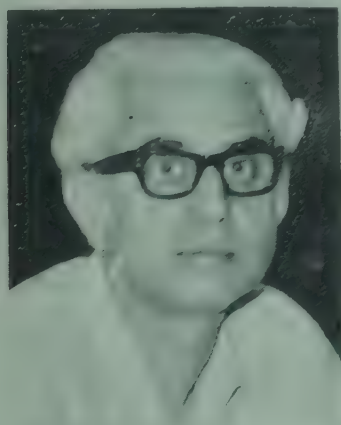
Padma Bhushan to Dr P.M. Bhargava

Dr P.M. Bhargava, Director, Centre for Cellular and Molecular Biology, Hyderabad, has been chosen for the



Presidential honour Padma Bhushan on the occasion of Republic Day 1986.

Also, Prof. A. Rahman, former Director of National Institute of



Science, Technology and Development Studies, New Delhi, has been chosen for the award of Padma Shri. □

Five teams of CSIR scientists win NRDC awards

This year's Republic Day awards of the National Research Development Cor-

poration (NRDC) comprise: cash awards of Rs 1.85 lakh to 48 inventors for 11 inventions, certificates of merit to 5 inventors for 2 inventions, and financial assistance to 2 inventors for the development of 2 prototypes. Five teams of scientists from four CSIR laboratories are among the recipients of cash awards.

Dr N.M. Raju, Shri L.M. Prasad, Shri S.P. Sinha, Shri B.N. Mishra and Dr B. Singh of the Central Mining Research Station, Dhanbad and Shri H.S. Ahuja of the Directorate General of Mines Safety, Dhanbad, have been jointly awarded Rs 25,000 for the development of quick setting supports to control roof fall accidents in mines.

Shri M.P. Swamy, Shri S. Bangaruswamy and Shri J.B. Rao of the Central Leather Research Institute, Madras and Prof. J.N. Chatterjee of the Patna University have been jointly awarded Rs 15,000 for the development of a process for the production of 'titan' (basic titanium sulphate).

Dr S.K. Basu, Dr R.C. Vishnu, Shri M.K. Banerjee and Shri V. Sarkar of the Central Mechanical Engineering Research Institute, Durgapur, have been jointly awarded Rs 15,000 for the development of hydraulically operated coil expanding and spreading machine.

Dr S. Rajadurai, Dr K.S.V. Srinivasan, Shri K. Parthasarathy and Shri Anand Dev of Central Leather Research Institute, Madras, have been jointly awarded Rs 15,000 for the development of a process for making acrylic resin emulsion binder.

Dr R.B. Mitra, Dr S.M. Abhyankar, Dr B.B. Ghatge, Dr S. Ghosh, Shri M.B.

Unde, Shri Nand Kishore and Dr D.G. Panse of the National Chemical Laboratory, Pune, have been jointly awarded Rs 10,000 for the development of a process for the manufacture of 'ethion' a useful pesticide. □

Dr S. Varadarajan, DG, CSIR, lays down office

Dr S. Varadarajan has relinquished charge of the post of Director General, Council of Scientific & Industrial



Research, w.e.f. 27 January 1986, consequent on his appointment as Chief Consultant, Planning Commission. □

Inside

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CSIR to Study Waxy Crude Transport Problem for ONGC

The Council of Scientific and Industrial Research (CSIR) will undertake a study, for the Oil and Natural Gas Commission (ONGC), on optimization of transportation of high waxy crude oil through submarine pipelines, under an agreement signed in New Delhi on 10 January 1986.

ONGC seeks to optimize the through-put of the Bombay High crude in their 203 km long submarine pipeline from offshore structure to shore terminal. The high wax content of the crude oil presents many intricate problems of flow. Even other countries, viz. Indonesia, Malaysia, etc. are faced with such problems, but individual experiences vary owing to specific crude oil characteristics.

There is a large technological gap in prediction of the crude behaviour through laboratory investigations during dynamic and prolonged static conditions. The scope of work covered in the consultancy would be conducive for comprehending underlying reasons for variations in flow behaviour, restartability, performance of flow improvers and allied characteristics of waxy crudes.

The consultancy shall generate an

adequate data base to help in the optimization and evaluation of the mode and quantum of additive treatments in the field for ensuring continuous and trouble free transportation of crude oil, with adequate safeguard for unexpected shutdowns.

CSIR through its Indian Institute of Petroleum, Dehra Dun; Regional Research Laboratory, Jorhat and the Regional Research Laboratory, Hyderabad, will be the prime consultant. The Council will associate with the well-known Italian Company Snamprogetti and the Plastics and Rubber Research Institute of The Netherlands (TNO) for the study of some specific aspects of this comprehensive consultancy programme.

The agreement was signed on behalf of ONGC by Shri J.S. Srivastava, Chief Chemist and on behalf of CSIR by Dr G. Thyagarajan, Director, Central Leather Research Institute, Madras. Col. S.P. Wahi, Chairman, ONGC, Dr S. Varadarajan, the then Director General, CSIR, senior ONGC officers, directors of RRL (Jorhat), RRL (Hyderabad) and IIP were present during the signing of the agreement. □

IIP gets ICMA award

The Indian Institute of Petroleum (IIP), Dehra Dun, has been given the ICMA (Indian Chemical Manufacturer Association) 'Special Citation' award for developing the basic know-how for extraction of aromatics from reformed naphtha.

A unit based on this know-how has already been commissioned recently at the Bharat Petroleum Corporation Ltd (BPCL) refinery, Bombay, which will process about 170,000 tonnes/annum of reformat feed and will produce 98,000 tonnes/annum of benzene and 17,000 tonnes/annum of toluene.

The aromatic-free naphtha leftover after the extraction will be used as feedstock in fertilizer and petrochemical industries for the production of hydrogen and olefins. This is the largest indigenous technology developed and commercialized in the area of petroleum refining.

The aromatic extraction unit has been built at a cost of about Rs 8.0 crore and it will result in a foreign exchange saving of about Rs 12 crore per annum. The technology has also been offered to other petroleum industries in the country [For more details see *CSIR News*, 35(1985), 153]. □

Foundation Day Celebrations at ITRC

The Industrial Toxicology Research Centre (ITRC), Lucknow, celebrated its 20th Foundation Day on 4 November 1985. Prof. Werner W. Schunk, Director, Institute of Occupational Medicine, Medical Academy, Erfurt, GDR, delivered the Foundation Day address and Shri Bir Bahadur Singh, Chief Minister, Government of Uttar Pradesh, presided over the function.

Delivering the Foundation Day address, Prof. Schunk said that 40% of the occupational intoxications in GDR are caused by heavy metals. Human beings and animals exhibit high tolerance to metals which are present as normal constituent of the body but very



Dr G. Thyagarajan, Director, CLRI and Shri J.S. Srivastava, Chief Chemist, ONGC (right), signing an agreement under which CSIR will undertake, for ONGC, a study on optimization of transportation of high waxy crude oil through submarine pipelines.

small quantities of nonessential metals become injurious and therefore it becomes difficult to establish general toxicological principles.

Addressing to the problem of manganese-induced reactions in animals and human body resulting in manganese poisoning, he suggested two ways for diagnosing manganese intoxication: (i) exposure to chemical substances and its reaction in the organism by using specific tests, and (ii) identification of the cause by physicians and toxicologists. Referring to various diseases like chronic bronchitis, fibrosis, pneumoconiosis, diseases of liver, kidney, cardiovascular and nervous system and cancer, he posed the question: whether these are occupational or environmental? To understand and solve the problems of these diseases, Prof. Schunk underlined the need for close cooperation between physicians and various specialists, and application of modern methods of biochemistry, immunology, genetic, microbiology, physiology and behavioural research. Prof. Schunk lauded the role of ITRC for conducting useful research in the area of industrial and environmental toxicology.

Referring to the rapid industrial development and modernization of agriculture, Shri Bir Bahadur Singh in his presidential address, cautioned against the hazards and ill effects of the chemicals and other hazardous substances the exposure to which seemed unavoidable during industrial revolution. He also referred to the efforts of the state government towards cleaning the *Ganga* river and appealed to the scientists of ITRC to make a common effort to restore the sanctity of the sacred river. Scientific devise could help in removing the pollutants from *Ganga* and other rivers, he added.

Commending the role of ITRC scientists in studying the long-term ill effects of methyl isocyanate gas, by establishing a temporary research centre at Bhopal after the tragedy owing to the gas leakage, he informed that the U.P.

Government in collaboration with ITRC had launched a programme to assist and prevent chemical disasters in various industries in the state.

Appreciating the initiation of new research programmes like preventive toxicology, immunobiology, environmental microbiology and insect biology at ITRC, Shri Singh urged the scientists to communicate the outcome of their research to the common man in simple language.

Highlighting the activities of ITRC, Dr P.K. Ray, ITRC Director, made a mention of the statistically designed survey carried out in collaboration with the Planning Institute, Government of U.P., to unravel the extent of adulteration owing to illicit use of prohibited colours in foodstuffs. The study was conducted in the rural village markets in 56 districts of Uttar Pradesh and covered 112 blocks and 224 village markets. The findings suggested that consumer movements and educational programmes required to be augmented to carry forward the developmental uplift and health status of the rural population.

Metabolic studies at ITRC on benzanthrone resulted in the development of a sensitive method to monitor benzanthrone exposure. A simple method for the detection of colour in food stuffs was also developed. The spectral characteristics of all 11 synthetic food colours permitted in India under the Prevention of Food Adulteration Act and the 6 commonly encountered non-permitted food colours were established. Dr Ray hoped that the technique developed would not only be useful in simultaneous handling of large number of samples at a time but will also prove to be less expensive.

With regard to metal toxicity, a longitudinal study up to the first generation in rats revealed that protein malnutrition further aggravated manganese induced behavioural and neurochemical changes especially in the F₁ generation. The increase in behavioural and neurochemical effects

was also observed after exposure of the subject concurrently to manganese and lead. The *in vitro* exposure of cadmium delayed the development and maturation of certain sensory motor coordination reflexes and hyperactivity in the pups.

Preliminary studies indicated that the accumulation of DDT in the brain regions was increased if the animals were pretreated with organophosphorus pesticides. Drugs or chemicals raising the cerebral level of GABA were found to protect the animals from the toxic effects of pesticides. Referring to the work being done in the immunobiology area, Dr Ray said that recent studies showed that immunological stimulation of the host significantly reduced the toxicity induced by cyclophosphamide, carbondisulphide and benzene. This procedure might help to cope with various toxic metabolites by inducing quick clearance of toxicants from the circulation and might also help in inducing an accelerated regeneration of the depleted biomolecules, Dr Ray added.

In the area of environmental microbiology, a bacteria capable of degrading acrylamide, phthalate esters and endosulfan was isolated from the soil. Such type of organism might be helpful for biodegradation of these environmental pollutants, added Dr Ray.

Referring to the studies conducted for determining the heterotrophic bacterial counts at various places of the *Gomti* river at a long stretch of 20 miles, Dr Ray said that the studies revealed seasonal variations of different organisms resistant to various heavy metals. Such studies might generate information regarding the case of prevalence of bacteria-induced epidemic diseases during various seasons in our country.

Dr Ray also referred to the initiation of efforts towards developing a microbial technology for biotransformation of distillery wastes to useful form of bioenergy. He also mentioned the possibility of converting high BOD

distillery industry waste into useful biogas (methane) by the application of the technology developed at the centre.

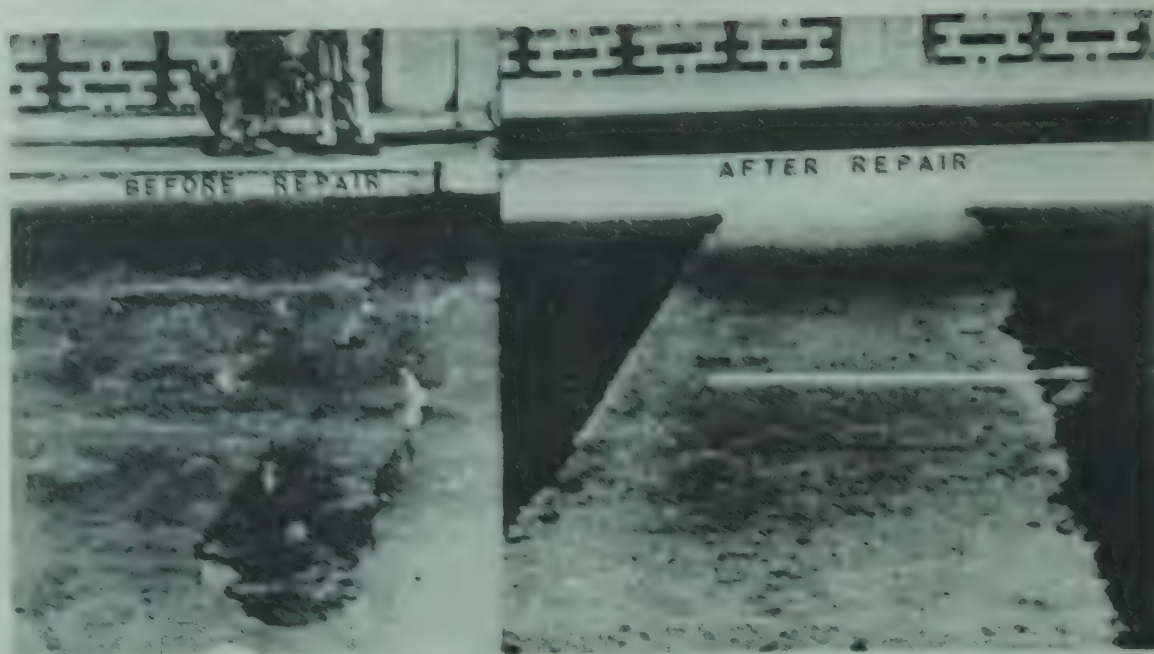
Mentioning about the ITRC facility for safety evaluation of plastic packaging material, Dr Ray informed that a large number of polymeric samples were evaluated for their potential to induce toxicity in the biological systems. Based on the data generated at the Centre, many of these materials had been further improved and released into the market. The reproductive and developmental toxicity studies on DEHP, a leachable plasticizer indicated its transfer to neonates through mother's milk and accumulation in the tissues of the neonates. Studies also indicated that endosulfan, acrylamide and styrene produce deleterious effect during the early postnatal period as compared to the adults.

With regard to environmental impact assessment of toxicants, capabilities were developed in experimental and applied toxicology using diverse species of aquatic flora and fauna.

A survey study conducted by the Centre revealed that 21 out of 105 workers of a silver jewellery industrial unit were suffering from lead poisoning. Concentration of lead in the work environment was found to be twice the threshold level value. Therapeutic studies on lead and cadmium intoxication indicated that vitamin B complex supplementation diminished the susceptibility to lead and cadmium intoxication and its deficiency increased the degree of intoxication. Selenium was found to protect the host from lead and cadmium induced hepato- and nephrotoxicity. □

CRRI helps restore distressed expansion joints of Indraprastha barrage bridge in New Delhi

The Indraprastha barrage bridge is an important link between parts of Delhi on the two sides of the river Yamuna. The expansion joints of the bridge had



A portion of the Indraprastha barrage bridge, New Delhi — before and after the repair. The distressed joints of the bridge were restored on the basis of measures suggested by CRRI, New Delhi.

not been performing satisfactorily for some time, leading to failures in concrete around these joints. At some expansion joints, the failed portions had developed into through holes of sizeable magnitude in the deck slab, thus impairing the efficiency and safety of traffic operations. Spot repairs were being carried out from time to time with the surface becoming more and more rough riding. A scheme that would have cost Rs 30 lakh for the restoration of these joints was prepared and referred to the Central Road Research Institute (CRRI) New Delhi. CRRI provided a solution to rehabilitate these joints at one-third of the estimated cost. In the CRRI method there is a provision of a structural slab extending between two adjacent cross beams at the expansion gap. The structural slab which bridges the gap between the two adjacent superstructures is doubly reinforced as it has a depth marginally greater than the wearing course. One end of this structural slab is bonded with one superstructure and the other end slides on a rubber bearing placed on the adjacent superstructure. A compressible joint filler board placed at deck level caters for the thermal movements of the bridge structure. CRRI's recommendations have since been implemented.

As similar problems arise at several other bridges, the innovative solutions provided by CRRI pave way for successful restoration of distressed expansion joints, providing better riding surface and increasing the service life of the bridges. □

National Seminar on Clay-based Materials for Structural Applications

A national seminar on Clay-based Materials for Structural Applications was held at the Regional Research Laboratory (RRL), Trivandrum, on 22 November 1985. The seminar, inaugurated by Dr A.D. Damodaran, Director, RRL-Trivandrum, and presided over by Dr B.K. Sarkar, Chairman of the Indian Ceramic Society (Kerala Chapter) (ICS-K), was organized by ICS-K.

A keynote address entitled, 'Structural clay products for construction' was delivered by Shri Zacharia George, Structural Engineering Research Centre, Madras, in which he compared the strength of various structural clay blocks such as brick, hollow block, porous brick, split tiles, vitrified clay products and burnt clay blocks of different shapes with the presently used materials, and highlighted the advan-

tages of the former. He showed that suitably structured clay blocks can be as strong as or even better than cement blocks.

The two technical sessions that followed discussed: pozzolonas, fly ash-clay bricks, lignite-clay insulation bricks, stoneware bodies and the defects, energy saving in kilns, vitrified flooring tiles, chemical bonded laterite bricks as substitute for clay products and use of clay washery sand in porcelain industry. The organizations represented were MECON, Ranchi; Neyveli Lignite Corporation, Tamil Nadu; Central Fuel Research Institute, Dhanbad; the RRLs at Bhopal, Jammu and Trivandrum, the Kerala State Committee on Science and Technology and Environment, Industries Development. The seminar recommended that there should be a closer understanding and rapport between the structural clay products industry and the R&D institutions to keep up the quality of the raw materials, products and also the firing schedules, even in the case of an imported technology. Also, there should be a closer link between the industry and the architects, who actually put in practice, the concept of new structures. A meeting of manufacturers and architects should be arranged to discuss these aspects and the Ceramic Society and RRL should take lead in this direction.

In view of the lack of awareness on the technological aspects of clay processing, the seminar recommended the introduction of a training course in clay processing, more elaborate and detailed than the one recently organized by the Kerala Chapter of the Society at RRL in May 1985, for the benefit of the personnel engaged in this industry.

Some specific areas for R&D suggested at the seminar were: extension of the technique of single-fired porcelain to red clay based raw materials, and development of beneficiation techniques for the ball clay deposits of Kerala in view of the non-availability of good quality deposits in the country. □

Synthesis of some biologically active pyrethroids

Shri R.S. Randad and Shri S.S. Bhosale of the National Chemical Laboratory, Pune, while working under the supervision of Dr G.H. Kulkarni of the laboratory, attempted the synthesis of some biologically active pyrethroids.

Studies made by Shri R.S. Randad

Shri Randad synthesized 2,3-seco-pyrethroids possessing dihalovinyl moiety and exhibiting enhanced biological activity. He also developed a synthetic route for 2,3-seco-pyrethroids possessing methyl as one of the substituents on the vinyl function. The compound showed good insecticidal activity.

Synthesis of analogues of potent 2,3-seco-pyrethroids possessing different alkyl substituents both on the vinyl function and α to the carboxylate function, was carried out and their insecticidal activity evaluated.

Chemical transformations of some cheap and abundantly available monoterpenes like (+) citronellol and (+) citronellal leading to 1,3-seco-pyrethroids were studied and their insecticidal activity evaluated.

Structure-activity studies of the various seco-pyrethroids were conducted. The influence of α -substituent and its nature, the nature of substituents on vinyl function and the effect of carbon chain length between ester function and vinyl groups, on the insecticidal activity were studied.

An elegant synthesis of 4 (R, S), 8 (S) dimethyldecanal, an aggregation pheromone of red flour beetle, a serious pest of cereals, was completed. The various intermediates encountered in the synthesis were obtained invariably in a state of high purity and good yields.

Studies made by Shri S.S. Bhosale

Shri Bhosale synthesized 3-phenoxybenzyl (+)IR-*trans*, 2,2-dimethyl-3-(2-chloro-2-*p*-chlorophenylvinyl

2-E-*p*-chlorostyryl/2-*p*-chlorophenylethynyl) cyclopropane carboxylates. These pyrethroids are reported to possess insecticidal, acaricidal and ectoparasiticidal activities.

The researcher also synthesized some optically active modified pyrethroids possessing IR-*cis*-absolute configuration at the site bearing ester function, from (+)-3-carene. These pyrethroids have been reported to possess high and selective activities.

Methyl IR-*cis* and IS-*cis*-2,2-dimethyl-3-*n*-propylcyclo-propane carboxylates and their corresponding cyclopropyl methyl alcohols, obtained from (+)-3-carene are important intermediates for the synthesis of miticidal esters which are expected to show good activity against tuber mites (*Rhyzoglyphus echinopus*) as well as against a wide variety of mites in agriculture. These intermediates were also synthesized.

The conversion of 2,5-disubstituted-1,3,4-thiadiazoles into medicinally important 2,4-disubstituted and 2,4,6-trisubstituted-1,3,4-thiadiazine-5(6H)-one derivatives was studied by different routes. These 1,3,4-thiadiazine derivatives are reported to possess sedative, analgesic and anti-inflammatory pharmacological properties.

Shri Randad and Shri Bhosale were awarded Ph.D. degrees by the Pune University for their theses based on these studies. □

NEW PUBLICATIONS

Ergot Production in India

India's contribution concerning ergot cultivation is remarkable as ergot is being grown in the country under both temperate as well as tropical conditions. Initial attempts to grow ergot were made by Tamil Nadu Agriculture Department in Nilgiri Hills, but these did not prove to be successful commercially. Later, the Regional Research Laboratory (RRL), Jammu, attempted large scale cultivation of

ergot in Jammu & Kashmir; the attempts were highly successful. The initial attempts made by RRL-Jammu, were further extended by the Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, and governments of Tamil Nadu and West Bengal. The title publication gives the latest information in general and experiences of Indian scientists in particular on the cultivation aspects of ergot. The monograph covers, in particular, the aspects related to the successful production of rye ergot as greater emphasis is being laid on large scale production and proper utilization of rye ergot in the Indian sub-continent. The monograph also has a bibliography (378 ref.).

Enquiries pertaining to the publication (compiled by K.S.M. Sastry, C.K. Atal and B.M. Kapur of RRL-Jammu, designed and produced by Publications & Information Directorate, New Delhi, royal 4to, pp 144) may be addressed to the Director, RRL-Jammu 180001.

* * *

Hops in India

The hop industry in India took the first leap forward in 1974 when a project on the cultivation of hops in Kashmir was seriously initiated by the Regional Research Laboratory, Jammu, at its Branch Laboratory, Srinagar. The research and development activities at RRL led to the successful domestication of this crop in the Kashmir Valley in a record time and from a non-existent industry in 1974, the country produced more than 180 tonnes of hops in 1982. The work published by RRL in the form of research papers, handouts, newspaper and audio-visual communication is the precise source of information, regarding the development of hop industry in India. But this information is not pieced together. Keeping this in view, RRL-Jammu has brought out a treatise titled *Hops in India*, designed to provide to both the users and hop growers of India and abroad, with the descriptive and factual

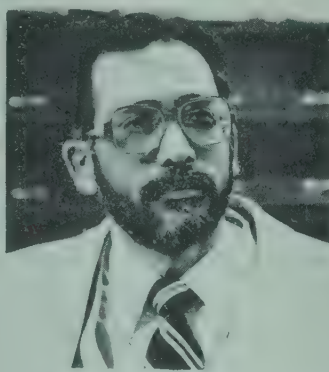
summation of the development of hop industry in India. In this publication (prepared by S.K. Bakshi and C.K. Atal of RRL-Jammu and designed and produced by Publications & Information Directorate, New Delhi), an attempt has been made to project the research work in progress at RRL-Jammu on breeding, agrotechnology, post harvest processing and chemistry of hops. Information collected from individual hop growers, hop processors and brewers has also been given. A bibliography (159 ref.), has been appended.

Enquiries pertaining to the publication (royal 4to, pp 76) may be addressed to the Director, RRL, Jammu. □

PERSONNEL NEWS

Prof. S. Banerjee appointed NML Director

Prof. Shilowbhadra Banerjee, Department of Metallurgical Engineering, Indian Institute of Technology, Bombay, has been appointed Director of the National Metallurgical Laboratory (NML), Jamshedpur, with effect from 24 December 1985.



Prof. Banerjee (born 3 April 1939), took his degree in Metallurgical Engineering in 1959 from the Indian Institute of Technology, Kharagpur, Master of Engineering in Advanced Metallurgy from the University of Poona in 1962 and Ph.D. in Metallurgical Engineering from the Indian Institute of Technology (IIT), Bombay in 1966.

Prof. Banerjee has 26 years experience in research, teaching, development and

consultancy: first as Teacher Trainee (1959-62), and subsequently as Lecturer (1962-64), Assistant Professor (1964-73), Associate Professor (1973-75), and finally as Professor (1975 onwards) at the Indian Institute of Technology, Bombay. He has been associated with: Development and teaching of several graduate and under-graduate courses in fracture, fatigue, phase transformations, heat-treatment, and materials science; Supervision of research work in the area of fatigue, fracture mechanics, alloy development and metallurgy of cast irons; Solution of industrial problems in areas such as failure analysis, fracture mechanics, product development, materials selection and process development; Transfer of a newly invented process technology; Planning, development and setting up of new laboratories in the areas of heat treatment technology and fracture mechanics; Design development and fabrication of instrumentation and equipment for R&D work; Research in cast iron metallurgy and teaching at the Metallurgical Engineering Department, University of Wisconsin, Madison, USA (1964-66); and Research and development in fatigue and fracture mechanics at NASA-Ames Research Center, California, USA (1977-79).

Prof. Banerjee has demonstrated that the size and geometry of a precracked body have a significant influence on the plastic zone size even when the plastic zones are small. Accordingly, most fracture analyses, theories and testing procedures proposed thus far, require reassessment and modification. He has evaluated, represented and isolated this influence, and has developed a new procedure of testing which gives the true fracture toughness of a material.

He has also proposed a new law of fatigue crack growth rate (FCGR) based on plastic energy dissipation rate which can account for the size and geometry dependence of fatigue crack growth and crack closure. The law has potential application in life prediction, design of structures, materials development and

in understanding the fundamentals of fatigue.

Prof. Banerjee was a Consultant to the Wright Patterson Air Force Base, USA, during 1983-84 and a Senior Visiting Scientist at the University of Dayton Research Institute, USA, in 1984.

Prof. Banerjee is a recipient of Kamani gold medal for best paper (1974), USAID fellowship (1964-66), NRC senior fellowship (1977-79) and National Metallurgists Award (1982). He is a member of the American Society for Testing and Materials and of the Indian Institute of Metals.

Prof. Banerjee has 45 publications in the area of fracture mechanics, fatigue and cast iron metallurgy and one patent (manufacture of spheroidal graphite iron) to his credit. He has invented a new process for the manufacture of spheroidal graphite iron.

Appointments/Promotions

Dr D.V. Singh

Dr D.V. Singh, Scientist EI and Head of Division of Agronomy and Soil Science, Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, has been promoted, on assessment, as Scientist EII (21 November 1984).

Dr Singh (born 15 May 1942) obtained his M.Sc. (1965) and Ph.D. (1973) both in Agricultural Chemistry from the Agra University, Agra. He joined Raja Balwant Singh College, Bichpuri, Agra, as Assistant Professor in 1965 and continued there up to March 1976. Thereafter, he joined the Indian Council of Agriculture Research, New Delhi, as Soil Scientist in the coordinated project on use of saline water in agriculture, and led the group of scientists working on the utilization of saline/sodic underground irrigation water and developed package of practices for the efficient use of Teliya water (sodic in nature) for important crops of the Agra region.

Dr Singh joined CIMAP as Scientist EI and Head of the Division of Agronomy and Soil Science on 21

November 1978. His significant contributions include introduction and commercialization of *Duboisia myoporoides* and improved spearmint strain, introduction and pilot scale cultivation of *Artemisia annua* in the country, screening of medicinal and aromatic crops for saline soils, harvest management in citronella Java and *Mentha* species; weed control in *Cymbopogon* species, *Dioscorea floribunda* and *Mentha* species and evaluation of vetiver for its oil and quality. Dr Singh visited USA under CSIR-NSF Exchange of Scientists Programme during 1984. He has been a member of the Working Group of Planning Commission on Land Reclamation and Development of Agriculture Sector for the Seventh Five Year Plan. Presently, he is a member of Board of Studies, Rohelkhand University, Bareilly (U.P.) and various other committees.

Dr Singh has also been coordinating the R&D activities of CIMAP regional centres and providing leadership to the rural development programme of the institute.

Dr B.R. Tyagi

Dr B.R. Tyagi, Scientist C, Genetics and Plant Breeding, Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, has been appointed on promotion Scientist EI (7 December 1985).

Dr Tyagi (born 5 July 1946) obtained his B.Sc. in Agriculture (1966) from the Agra University, M.Sc. (Ag.) in Genetics and Plant Breeding (1969) from the Banaras Hindu University and M. Phil. (1971) and Ph.D. (1974) in Agricultural Botany from the Institute of Advanced Studies, Meerut University.

Prior to his joining CIMAP in December 1981, he was on the teaching faculty of the Banaras Hindu University from 1973 to October 1974 and then served the Indian Council of Agriculture Research, New Delhi in 1974 as Assistant Geneticist at the Central Potato Research Institute, Simla. In

October 1975, he was inducted into ARS as Scientist S1 (Genetics) and was promoted on assessment as Scientist S2 in 1980.

His research work on the establishment of a large number of chromosomal interchange stocks led to the beginning of the basic information necessary for the proper understanding and exploitation of the cytogenetic potential of pearl millet. He has been involved in locating new sources of bacterial, fungal and viral diseases, specially those caused by *Pseudomonas solanacearum* E.F. Smith, *Phytophthora infestans* (Mont.) deBary and PVX and PVY, in the cultivated and wild *Solanum* species and their transfer to *Solanum tuberosum* L. using polyhaploids. Dr Tyagi developed a superior strain of CIMAP/MAS-1 which found wide acceptability with the mint growers owing to its high oil and menthol yields and changed the entire structure of the menthol industry in the country which was till then facing serious crisis because of deterioration of the existing strain under cultivation. Recently, he has produced still better Japanese mint strain CIMAP/Hybrid-77 and high oil yielding superior strains CIMAP/MSS-5 of common spearmint (*Mentha spicata* L.) and CIMAP/MCAS-2 of Scotch spearmint (*Mentha cardiaca* Baker).

Dr Tyagi has to his credit more than 50 research papers and review articles. Also, he has been associated with the preparation of status report on genetic resources of important medicinal and aromatic plants in South Asia on behalf of I.B. P.G.R., Rome.

Dr Vishwapaul Mahajan

Dr Vishwapaul Mahajan, Scientist C and Scientist-in-Charge, CIMAP Regional Centre, Srinagar (J&K) has been appointed on promotion Scientist EI (25 January 1985).

Dr Mahajan (born 4 July 1932) graduated from the J&K University and in 1954 joined Indigenous Drugs Enquiry of Indian Council of Medical Research, under Late Col. Sir R.N.

Chopra at the Drug Research Laboratory (now Regional Research Laboratory), Jammu. At Drug Research Laboratory, he developed a method for production of diosgenin from *Dioscorea deltoidea*, which was patented. CIPLA, Bombay and Drug Factory, Jammu produced diosgenin worth Rs 4.66 lakh and 116.1 lakh respectively, by this process.

Dr Mahajan secured first class and stood 2nd in rank in A.I.C. examination of the Institution of Chemists, India (Calcutta) in 1961. He got M.Sc. in Organic Chemistry from the J&K University in 1967 and Ph.D. from the Delhi University under late Prof. T.R. Seshadri, FRS, in 1971.

Dr Mahajan moved to CIMAP Regional Centre, Jammu in 1974. He has worked on many medicinal and aromatic plants and isolated a number of new and known compounds. Their structures were established by chemical and spectral methods and also by partial synthesis. In addition to the method of production of diosgenin, Dr Mahajan developed a number of methods for production of active principles like atropine, hysocine, osthol, solasodine, sennoside, angelicin, sylibin, xanthotoxin, ephedrine, ergotamine, rutin, etc. The process for the production of xanthotoxin gives a yield about five times of that obtained by method developed by others. The processes for production of osthol and ergotamine have been patented. Recently, he developed a process for the production of artemisinin from *Artemisia annua*, a Chinese antimalarial drug introduced by CIMAP.

Dr Mahajan visited Hungary under Indo-Hungarian programme of Science and Technology in 1978. He is a recognized guide for research leading to Ph.D. in chemistry of universities of Jammu, Meerut and Kumaon. So far three research scholars have obtained Ph.D. in chemistry under his guidance. Dr Mahajan has to his credit about 42 publications and three patents.

Honours and Awards

Prof. Debiprasad Chattopadhyaya

Prof. Debiprasad Chattopadhyaya, Project-in-Charge, History of Science and Technology Project of the National Institute of Science, Technology & Development Studies, New Delhi, has been recently awarded the Gold Medal of the Visalandhra Vignan Parishad, Vijayawada, for his writings on Science in India. □

ANNOUNCEMENTS

Indo-US Workshop on the Role of Predisposing Conditions of Health, Nutrition and Environment and Safety of Drugs and Chemicals

A four-day Indo-US Workshop on the Role of Predisposing Conditions of Health, Nutrition and Environment and Safety of Drugs and Chemicals is being organized by the Industrial Toxicology Research Centre (ITRC), Lucknow, at ITRC during 25-28 February 1986. The purpose of the workshop is to define the current state of the art of knowledge in the area and assess the technologies available in the involved disciplines. The workshop would include invited lectures, panel and round-table discussions and a banquet lecture by an eminent expert. About 20 experts from USA and 25 from India have been selected for this workshop.

Predisposing conditions of health, nutrition and environment significantly influence the efficacy of drugs and toxicity of industrial and environmental chemicals. The information regarding the mechanisms by which these factors modify the actions of commonly encountered chemicals and widely used drugs is essential in the assessment of their safety. The workshop will provide a forum to the scientists and experts for discussing and exchanging views on subjects like regulatory, biochemical, immunological aspects, nutritional, environmental and disease factors, effect of predisposing conditions on selected target organ system and problems related to pregnancy, imma-

turity and senescence. The workshop will also attempt to highlight the suitable *in vitro* and animal models to study the influence of the predisposing conditions of health, nutrition and environment on the safety of chemicals and drugs.

The workshop will be of great significance in view of the prevailing malnutrition and infectious diseases in the country besides environmental exposure to variety of chemicals. Further details regarding the workshop can be had from: The Director, ITRC, Mahatma Gandhi Marg, Lucknow 226001.

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CECRI Refresher Courses 1986

The Central Electrochemical Research Institute (CECRI), Karaikudi, will be organizing the following refresher courses during 1986 (March onwards) (date of commencement of the course is given in parentheses):

One-month Extended Courses

- (1) Storage battery technology (3 March),
- (2) Corrosion science and engineering (7 April),
- (3) Industrial analysis (2 June), (4) Electrochemical engineering (4 August), (5) Basics of electrochemistry (1 October).

One week Condensed Courses

- (1) Solar selective black coating (31 March),
- (2) Storage battery technology (26 May), (3) Basics of electrochemistry (2 July), (4) Electrobiolgy (10 July), (5) Corrosion science and technology (17 July), (6) Industrial metal finishing (28 July), (7) Luminescent materials and devices (3 September), (8) Corrosion of steel in concrete (11 September), (9) Electroforming and heavy deposition (19 September), (10) Electrometallurgy of aluminium and magnesium (30 October), (11) Electrochemical pollution control (10 November), (12) Electrochemical engineering (17 November), (13) Organic and inorganic electrochemicals (24 November), (14) Electronic instrumentation (1 December), (15) Photovoltaics and photoelectrochemistry (8 December), (16) Precious metal plating for electronics (15 December), (17) Trouble shooting in plating and metal finishing (22 December).

The course charges would be Rs 2000 for a one-month extended course and Rs 500 for a one-week condensed course. A few seats in each course are reserved for bonafide students and teachers at concessional rates on prior request.

Detailed syllabus and application form can be obtained on request from the Director, CECRI, Karaikudi 623006. Applications in all respects should reach the Director at least one month in advance of the commencement of the course. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

14 MAR 1987

C. F. T. R. I. MYSORE

SHANTI SWARUP BHATNAGAR PRIZES: 1984

Twelve scientists/technologists have been selected for the Shanti Swarup Bhatnagar Prizes in Science and Technology for the year 1984. Each award carries a cash of Rs 20,000 and a scroll. The recipients of the awards, discipline-wise, are:

Biological Sciences: Dr K.R.K. Easwaran, Indian Institute of Science, Bangalore and Prof. T.J. Pandian, Madurai Kamaraj University.

Chemical Sciences: Prof. P. Natarajan, University of Madras, Madras and Prof. K.J. Rao, Indian Institute of Science, Bangalore.

Earth Sciences: Dr S.K. Acharyya, Geological Survey of India, Calcutta and Dr S. Krishnaswami, Physical Research Laboratory, Ahmedabad.

Engineering Sciences: Dr D.D. Bhawalkar, Bhabha Atomic Research Centre, Bombay, and Dr P. Ratnasamy, National Chemical Laboratory, Pune.

Medical Sciences: Dr J.N. Sinha, K.G. Medical College, Lucknow and Dr B.S. Srivastava, Central Drug Research Institute, Lucknow.

Physical Sciences: Prof. R. Cowsik, Tata Institute of Fundamental Research, Bombay and Prof. R. Shashidhar, Raman Research Institute, Bangalore.

No award has been given in mathematical sciences for 1984. ☐

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Award 1985

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NPL gets Prof. M.C. Joshi
memorial prize

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Dr A.P. Mitra takes over as Director General, CSIR

Dr A.P. Mitra, Director, National Physical Laboratory (NPL), New Delhi, has assumed office of the Director General, CSIR, and Secretary, Department of Scientific & Industrial Research, with effect from 26 February 1986.

Dr Mitra (born 21 Feb. 1927) has had a distinguished record of academic and professional achievements. A first class first M.Sc. (1948) of the Calcutta University, he did his doctoral work with (late) Prof. S.K. Mitra and was awarded the prestigious Premchand Roychand Studentship and the Mouat Gold Medal for his work on 'Ionospheric studies by radio astronomical techniques'. To Dr Mitra primarily goes the credit for the development in Australia of the now famous cosmic radio noise technique. He worked as a Visiting Professor in the Pennsylvania State University, USA, until 1954.

With NPL since 1954, Dr Mitra has been one of the principal figures behind the development of a strong base of radioscience research in India. He has led ionospheric research for three decades. Starting with the International Geophysical Year, Dr Mitra introduced the cosmic radio noise technique for exploring the ionosphere (including the topside ionosphere inaccessible to classical techniques). He added new techniques such as: satellite radio beacon transmission with the availability of COSMOS V and S-66 satellites radio beacons at low angles for monitoring of large-scale tropospheric disturbances (undetected until then);

SODAR for mapping tropospheric radio ducts with high resolution as base data for troposcatter systems; microwave radiometry jointly with radiosondes for water vapour and rain attenuation studies; and a whole range of payloads in rockets.



The cosmic radio noise technique (later called riometer), developed jointly with C.A. Shain, has been in continuous use since IGY for the study of solar flares for detection of atmospheric nuclear explosions and has provided a powerful tool for monitoring of flare proton bursts at ionospheric altitudes. Dr Mitra showed that at low latitudes (such as those in India) even the normal ionospheric absorption can be monitored, that the topside ionosphere can be explored, and that it is possible (especially at low latitudes where F-region contribution is large) to estimate electron temperatures at F-region height, which provide additional input for reference ionospheric modelling. Later with Somayajulu, he put in a riometer receiver in a rocket.

His contributions in ionospheric physics particularly in ion and neutral chemistry in the upper atmosphere and

on the ionospheric effect of solar flares have had profound effect internationally. His book on *Ionospheric effects on solar flares*, since translated in Russian, is a reference document on solar flare effects. His recent efforts have successfully led to the recognition of the crucial role that some of the minor constituents, especially ozone and nitric oxide, play on our environment.

Dr Mitra has been a guiding force in shaping India's scientific research programmes in upper atmospheric physics and related areas. As Secretary of the Indian National Committee, he guided the IGY and the IGSY programmes in India; introduced radio communication predictions that now cover frequencies from a few kHz to many GHz and serve all radio traffic organizations in India; established the Associate Regional Warning Centre (ARWC) that helps in rapid dissemination of solar and geophysical data over the Indian subcontinent; guided the development of ionospheric research in many of the Indian universities and universities and institutions abroad; has been intimately associated with many International bodies (especially COSPAR, SCOSTEP and URSI).

Dr Mitra has formulated and is now guiding the Indian Middle Atmosphere Programme as Chairman of its Scientific Advisory Committee. He has recently been elected President of URSI (1984-87) (the first Indian and the second Asian to be elected) in recognition of his contributions to radio science nationally and internationally. He is recipient of a number of prestigious awards: Bhatnagar Award for Physical Sciences 1968; Nehru Fellowship (1978-80); Sir C.V. Raman Award (1982) and FICCI Award (1982). He is a Fellow of INSA and the Indian Academy of Sciences and is Member of the International Academy of Astronautics. He is on the editorial boards of *Space Science Review*, Netherlands; *Indian Journal of Radio and Space Physics* and *Mausam*. Also, he is Regional Editor of *Journal of Atmos-*

pheric and Terrestrial Physics, UK. He has 142 papers and 15 books/monographs to his credit. Twenty-one students have carried out their Ph.D. work under his guidance. □

Indo-US Workshop on Wind Disaster Mitigation

An Indo-US Workshop on Wind Disaster Mitigation, sponsored by the Department of Science and Technology (DST), and the National Science Foundation (NSF), USA, was organized during 17-20 December 1985 at the Structural Engineering Research Centre, Madras. The workshop was inaugurated by Shri K. Rajaram, Minister for Industries, Government of Tamil Nadu. Dr John D. Stempel, U.S. Consul General at Madras, presided over the function. Thirty-five delegates, including 9 from USA, participated in the workshop. In addition to the delegates, four observers also attended the workshop.

On the first two days, 17 papers covering different topics in the areas of wind engineering and wind disaster mitigation were presented. During the last two days, the participants discussed in four groups, the following topics for possible collaboration between the two countries: Wind characteristics; Model studies; Field measurements; and Codes and design; damage analysis. Each of these groups identified the collaborative research projects in the respective areas and prepared draft reports for future action.

The workshop recommended that an Indo-US subcommittee on wind engineering be formed which should be responsible for: identifying, priority-wise, the future programme of work; facilitating the implementation of programme projects, monitoring their progress and evaluating the results of research; disseminating and exchanging information (scientific, administrative and operational) between the two countries; and facilitating the exchange of junior scientists participating in training programmes.

The valedictory function was held on 20 December 1985. Shri S.K. Das, Director General of Meteorology, India Meteorological Department, delivered the valedictory address and Dr S. Ahmed Meer, Counsellor for Scientific & Technological Affairs, US Embassy, presided. □

RRL-Jorhat receives FICCI Award 1985 for Rural Development Activities

The Federation of Indian Chambers of Commerce and Industry (FICCI) Award for 1985 has been given jointly to the Regional Research Laboratory, Jorhat and the Gujarat Narmada Valley Fertilisers Co. Ltd, Narmada Nagar, for their activities in the field of rural development. It is worthwhile to mention that in 1982 RRL-Jorhat received the FICCI Award for its outstanding contribution in the field of science and technology. RRL-Jorhat received the award for 1985 for rural development activities, specially in the backward areas of the north-eastern region, towards the promotion of industries based on medicinal and aromatic plants like citronella, lemongrass and dioscorea; food-crop like edible mushroom; paper slate; water filter candles and light roofing sheets. □

NPL gets Prof. M.C. Joshi Memorial Prize for developing air liquefier plant

The liquid air/nitrogen plants produce liquefied air (-195°C) which is essential for storing bull semen for artificial insemination. As the country has a large scale cattle breeding programme, these plants assume great significance. Till now, Philips, Holland, has the monopoly for these plants, and India has imported about Rs 30 crore worth of such plants from Philips. Also, there is an expected demand of Rs 50 crore worth of such plants in the country.

The National Physical Laboratory (NPL), New Delhi, undertook the development of a Stirling cycle based

air liquefier of 5-6 litres/hr capacity about five years ago. It was indeed a great technological challenge as the development comprised more than a thousand sophisticated and precision parts like water cooled heat exchanger, regenerator, freezer, oil gear pump, various control valves and pistons and piston housing, etc. NPL designed the plant with the parts developed within the country. The total assembly of the plant was completed with each sub-assembly having been vigorously tested. The plant has been running for the last two years successfully with the production rate of 3-4 litres/hr.

The Indian Cryogenics Council (West Zone) has recognized this development of NPL as the best work in the area of cryogenics technology for the year 1984 and has awarded it the Prof. M.C. Joshi Memorial Prize for this development at the International Conference on Cryogenics, held at Calcutta, during 10-13 December 1985. The area of the liquid nitrogen plant, based on Stirling cycle, has been recognized as the most important and difficult area by the Department of Science and Technology in its National Status Report, prepared on request from the Planning Commission.

The technology development, which is unique in the country, has large repercussions for further development in the area of small electrical power generators of 5-200 kW range for supplying electrical power to the remote rural villages in an efficient manner. This technology also finds important application in the development of cryogenic minicoolers (77°K in 1 Watt capacity range) for the night imaging systems and for guided missiles for the Defence. □

High-yielding lemongrass variety: CIMAP/L.S.-48

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, has developed a new high yielding variety, CIMAP/L.S.-48, of lemongrass which gives 50% higher yield of

oil per hectare than that obtained from the best variety so far cultivated in the country.

Lemongrass oil is used in perfumery industry. Besides, it is an important source of citral which has applications in medicine, perfumery, confectionery and beverages. It can be harnessed for production of β -ionone (used in synthesis of vitamin A) and several other chemicals. The oil derived from the new lemongrass variety possesses high citral content (85-90%). The yield of oil is also high.

Development of this variety at this juncture is quite significant because the Indian lemongrass oil industry has been facing a crisis during the past two years. At one time India was the major producer and supplier of this oil to the world market. The country exported as much as 1500 tonnes of the oil annually in early fifties. The quantity decreased to 700-800 tonnes during the last ten years and further went down to mere 300-400 tonnes in the last two years.

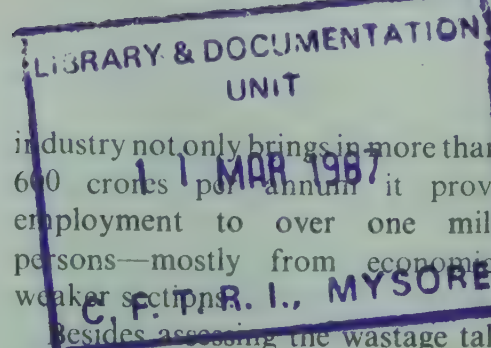
One of the main reasons for decrease in production of lemongrass oil has been very low yield of the existing lemongrass varieties in the country, making returns to farmers unprofitable. With the result, lemongrass growers are switching over to other profitable crops.

The new variety will go a long way in rectifying the situation. It will be profitable for farmers to grow this crop even on marginal and sub-marginal lands. This would result not only in the increased supply of lemongrass oil for internal consumption but also for export. □

CLRI commences nation-wide survey of hides and skins

The Central Leather Research Institute (CLRI), Madras, has been assigned by the Ministry of Commerce, the task of conducting an all India survey to assess the volume and quality of production and marketing aspects of the hides and skins.

Leather industry is a great foreign exchange earner for the country. The



industry not only brings in more than Rs 600 crores per annum it provides employment to over one million persons—mostly from economically weaker sections.

Besides assessing the wastage taking place at different stages and suggesting remedial measures, CLRI survey would take stock of the available quantity and quality of hides and skins in the country. It would study collection, curing, preservation and grading practices and marketing and movement of the raw material in different states.

Ten states representing different regions have been chosen, and from each state 12 villages, 6 taluk headquarters and 3 district headquarters will be selected. Concerned interests will be contacted to obtain first hand information on different aspects of production, marketing and utilization of raw materials. The market network connecting the primary rural and urban centres on the one side and the ultimate terminal markets on the other will be traced and studied. In all, about 15000 respondents will be contacted during the field work.

The survey will be conducted by economists, statisticians, technologists and veterinary scientists of CLRI supplemented by participation from other CSIR laboratories and adhoc field staff who will be specially trained for the actual field work.

Ninety per cent of the data emanating from the survey will be transferred on magnetic tapes for permanent storage. The computer centre of the Regional Research Laboratory, Hyderabad, is being associated in this project scheduled to be completed by 31 October 1986. □

Chemically bonded building bricks based on laterite

Laterite is an abundantly occurring ceramic raw material widely distributed in almost all the districts of Kerala and many parts of India, which could be used for making building bricks. However, the normal procedures

adopted in the case of clays, such as shaping and firing, do not suit in the case of laterite since the firing temperatures are very high.

The Regional Research Laboratory, Trivandrum, has developed a chemical method for binding the laterite and converting it to building bricks through the normal wet way followed by drying at 350-400°C. Bricks with strengths up to a maximum of 125 kg/cm², with water absorption around 15% and density 1.95-2.1 g/cm³ could be obtained depending upon the source of the raw materials. These bricks have been tested for weathering conditions and thermal stability and have shown negligible dimensional changes. □

Palm oil in small scale sector

The Regional Research Laboratory (RRL), Trivandrum, has designed a flow sheet for the production of palm oil in the small scale sector, under a project sponsored by the Indian Council of Agricultural Research, New Delhi. The flow sheet involves standardization of the maturity of the oil palm fruit and its sterilization to arrest action of libase from producing free fatty acids, followed by extraction of the oil. A number of experiments were performed and 60 kg of oil was extracted. A preliminary consumer evaluation of palm oil gave the required acceptability levels. Prior to extending the above acceptability tests among a wider section of people the product was sent to the Analytical Quality Control Laboratory of the Central Food Technological Research Institute, Mysore, for getting the necessary clearance. □

Studies on polyurethanes crosslinked with graft copolymers

Applications of polyurethanes in numerous fields such as coatings, adhesives, plastics, elastomers and foams are gaining much ground over other materials. Besides their low thermal conductivity and good abrasive

resistance, they impart outstanding gloss and good adhesion. Conventional urethane surface coatings can be divided as (i) one component and (ii) two component coatings. In two component coatings, polyurethane prepolymers are mixed with the hydroxyl component just prior to the application.

Graft copolymers, especially of chlorinated rubber and poly(vinylchloride-co-vinyl acetate) are suitable leather top coats with certain drawbacks such as tackiness, and adhesion. With a view to getting the combined properties of these graft copolymers with polyurethanes, Shri K. Anbazhagan, a CSIR research fellow in Polymer Division, Central Leather Research Institute (CLRI), Madras, synthesized polyurethanes crosslinked with graft copolymers and studied their physico-chemical properties.

Shri Anbazhagan explored the characteristics of the resultant coating materials by stress-strain analysis, thermogravimetric analysis, differential scanning calorimetry, swelling techniques and dielectric measurements. Films obtained from these coating materials exhibited higher tensile values with improved thermal and mechanical properties. Suitability of these materials onto leather surfaces was tested and it was found that these materials could serve as top coat with good adhesion and virtually no tackiness.

Shri Anbazhagan worked under the guidance of Dr C. Rami Reddy and Dr K. Thomas Joseph and was awarded Ph.D. degree by the University of Madras for his thesis based on these studies. □

PROGRESS REPORTS

SERC-Roorkee Annual Report : 1983-84

The Structural Engineering Research Centre (SERC), Roorkee, has brought out its annual report for 1983-84, according to which the laboratory continued its R&D activities in the fields of high rise buildings, large span structures, underground structures

including tunnelling, and computer software for civil engineering.

Development of computer software for civil engineering applications has been one of the strong points of SERC since its inception. During the year, the software package for the analysis, and to some extent design, of high rise buildings considering them as three dimensional entities was upgraded. In response to user demand the two dimensional portion has been separated out and is now an independent system. Efforts were continued to improve the element library of the programme package for non-linear analysis of structures considering material and geometric non-linearities. Development of MATFOR—the matrix operations package was nearing completion. It is a comprehensive package which would permit a very wide variety of single and double precision and complex matrix operations. The package is essentially machine free and has built-in possibilities of writing inner loops in the machine language of a specific installation to speed it up further. Out of the projected 1800 routines, 1400 were completed. The user's manual was also in an advanced stage of compilation. It is hoped that this package would be operational next year. Work on the development of pre-processors was continued. The existing pre-processors were extended to cover other major programme packages available at the laboratory. The development of a general purpose pre-processor was in an advanced stage. This pre-processor would accept user instructions for output formatting. A computer programme was successfully developed and tested for the non-linear optimization of structures. It was found to work satisfactorily in the examples tested. The development of software for analysis, design and estimation of overhead water tanks, including staging and foundation, was completed. The user's manual was in an advanced stage of preparation. This software would be available to users next year.

Efforts were continued to disseminate the available software to users throughout the country. Towards this end, a general purpose nonlinear programme package was implemented on VAX-11/780 system. The software for the analysis of plane frames using distribution techniques was supplied to several users. The stiffness matrix approach for static and dynamic analysis of two dimensional building frames with or without shear walls was also made available to users.

A state-of-art report on probabilistic methods of design was in an advanced stage of preparation; it will serve as a basis for the R&D activity in this area. Theoretical work was continued on the project on soil structure interaction and that on the determination of the properties and effect of infilled frames. Discussions were being held with the departments engaged in construction in the Himalayan region, and with other agencies responsible for the execution of underground structures with a view to identifying the appropriate course of R&D activity.

The handbook prepared by the laboratory on the design of columns and published sometime ago continued to draw several requests for additional information especially for non-rectangular columns. The project on this aspect was brought to a conclusion during the year. Several sets of design charts were prepared. All this work was completely automated on the DEC 2050 computing system.

At the request of the Highway Research Board (HRB), the laboratory undertook the preparation of a state-of-art report on the dynamic response of bridges permitting vehicle-structure interaction. Another state-of-art report on *in-situ* testing of bridge superstructures was brought out in the RILEM Journal.

Experimental work was continued on the study of the effect of shear connectors. Facilities were being installed for special tests on elastomeric bearings at cryogenic temperatures and

in an ozone atmosphere. Experimental work was continued to gain familiarity with the use of microconcrete as a model material. □

NEW PUBLICATIONS

Catalogue of Conference Proceedings 1980-84

One of the objectives of the National Science Library (NSL) of the Indian National Scientific Documentation Centre, New Delhi, is to acquire conference proceedings in the field of science and technology. NSL has been attempting to build up a collection of conference proceedings after a careful selection of worthwhile items from various primary and secondary sources. This collection of conference proceedings in NSL has been classified and catalogued. Up to 1982, the entries have been prepared according to AACRI (North American Text) and from 1982, AACR2 has been followed. The UDC scheme has been followed in classification.

The present catalogue of conference proceedings in NSL includes additions during 1980-1984, accounting for 323 entries. The entries are arranged according to broad subject fields.

To facilitate retrieval, a list of alphabetical subject headings used is given. Five indexes, one each on editor/compiler, subject, sponsor/organizer, date, and place are appended. Enquiries pertaining to the catalogue (mimeographed) may be directed to the Librarian, National Science Library, INSDOC, 14 Satsang Vihar Marg, New Delhi 110067.

* * *

RRL Jammu, Silver Jubilee Commemorative Lectures

The Regional Research Laboratory (RRL), Jammu, completed 25 years of its take-over by the Council of Scientific and Industrial Research in December 1982. The period December 1982-November 1983 was celebrated as the Silver Jubilee Year. The celebrations were mostly of scientific nature and

consisted of symposia, panel discussion, training course and commemorative lectures.

As part of the silver jubilee celebrations three series of lectures were delivered by Dr R.K. Sharma of the University of Tennessee (USA), Dr U.K. Pandit of the University of Amsterdam (Holland) and Dr P.D. Gupta of the Centre for Cellular & Molecular Biology (CCMB), Hyderabad—Series I: Mediatory role of cyclic GMP and calcium in adrenocortical steroidogenesis (two lectures), and Regulation of adrenocortical protein synthesis—a new concept; Series II: Studies with models of folate coenzymes, and Addition of ester anions to nicotinium salts, approach to synthesis of alkaloids; and Series III: Application of electron microscopy in biological research, High voltage electron microscopy, Electron microscopic probes for localization of cellular antigens, and Recent advances in mitochondrial research.

In order to share the contents of these lectures with other scientific workers the lecture series has been published in a book form by RRL-Jammu (designed and produced by the Publications & Information Directorate, New Delhi).

Enquiries pertaining to the publication (royal 4to, pp 94) may be addressed to the Director, RRL, Jammu. □

CONFERENCE BRIEFS

Seminar on International Cooperation for Exploitation and Utilization of Plant Genetic Resources

Dr P.D. Dogra of the National Botanical Research Institute, Lucknow, visited Japan, on deputation, during 4-16 November 1985 to present a country report on 'Gene resources of forest trees of India' at the ASCA (Association for Science Cooperation in Asia) seminar on International Cooperation for Exploitation and Utilization of Plant Genetic Resources, organized by the Japanese Secretariat Science and Technology Agency, Tokyo. He also

attended the 85-International Biosymposium organized (14-15 November 1985) by the New Technology Promotion Division, Planning Department, Kagoshima Prefectural Government, Japan, where he presented a technical paper entitled: 'Technology of tree reproduction'. Also during his visit, Dr Dogra visited many institutions at Tskuba and Kagoshima, to gather knowledge on the utilization of natural gene resources of plants and on technology of their seed and germplasm multiplication and storage with reference to germplasm banks in the institutes visited. ASCA seminar and the 85-International Biosymposium concluded that all ASCA member countries must collaborate in exchange of plant genetic resources information on technology of storage and utilization. Technicians and professional scientists must be exchanged for advanced training. Deep concern was expressed by participants on depletion of, and on the urgent need of conservation of forest genetic resources.

* * *

Inventiveness for Development Purposes

Shri N.R. Subbaram, Joint Adviser (Patents), CSIR, was deputed to Plodiv, Bulgaria, from 12 to 15 November 1985, for attending the International Seminar on Inventiveness for Development Purposes at the invitation of the Government of Bulgaria. This seminar was organized jointly by the Government of Bulgaria and the World Intellectual Property Organization, Geneva, in connection with the World Exhibition of Achievements of Young Inventors. About 200 persons from 63 countries participated in the seminar.

* * *

XI International Conference on Soil Mechanics and Foundation Engineering

Dr R.K. Bhandari, Deputy Director, Central Building Research Institute, Roorkee, attended the title conference held at San Francisco during 10-17 August 1985. More than 2000 delegates

from 100 countries attended the conference.

Dr Bhandari made an invited panel presentation on the rapid Landslides of the Himalayas, and later participated in the meetings of the International Commission on Landslides as well as that of the ISSMFE's Subcommittee on Landslides. He represented India on both these international committees for the second consecutive term (1985-89). He also contributed a paper on 'Field monitoring of an oil tank founded on soft clay deposit treated with stone columns' based on the R&D carried out at CBRI.

The highlights of Dr Bhandari's presentation included his advocacy of the recycling of freely available slope waste and colluvium by their utilization for construction of low cost retaining walls or Gabions or Tensar type baskets tied together as sausage walls. He also presented an approach for predicting and monitoring of high speed flows with particular reference to the Himalayan mass movements. The presentation included a case record on the 100 year old *Sher-ka-Danda* hill landslide of Nainital which was responsible for the partial filling of the Nainital lake. Dr Bhandari's mission was to investigate whether the latest technologies of radar and acoustic emission have relevance to problems of geotechnical engineering in India. His study has shown that geo radar holds a great potential for application in civil engineering. A full length paper on the subject is available from CBRI on demand.

The world experience on acoustic emission technology as applied to geotechnical engineering is however grossly limited and at this time the indications are that considerably more work and thought is required before field application of the technique could be visualized in the Indian context. □

TRAINING COURSES

Industrial Metal Finishing

The Central Electrochemical Research Institute (CECRI), Karaikudi, orga-

nized a condensed course on Industrial Metal Finishing during 16-21 December 1985. The course material covered: surface preparation, electroplating of common metals and precious metals, alloy plating, coatings for solar application, electroforming, anodizing of aluminium, organic and inorganic surface coatings, testing and analysis of coatings and their properties, case studies, effluent treatment, mechanism of protection by metallic and non-metallic coatings. Twenty-two persons from various organizations participated in this course.

* * *

Corrosion of Steel in Concrete

The Central Electrochemical Research Institute (CECRI), Karaikudi, organized a short term course on Corrosion of Steel in Concrete during 26-28 December 1985. The course covered: basic aspects, experimental technique, survey and monitoring, techniques and instruments, pozzolana concrete, prestressed concrete, concrete deterioration and control measures. Six participants from different organizations attended the course.

* * *

Demonstration-cum-training programme on life extension of coconut leaf thatch

As a part of technology transfer through extension services, the Regional Research Laboratory, Trivandrum, organized a one-week demonstration-cum-training programmes on life extension of coconut leaf thatch at Trichur, for the benefit of Centre of Science and Technology for Rural Development (COSTFORD), Trichur. Shri Achuta Menon, Chairman, COSTFORD, and former Chief Minister of Kerala, also witnessed a demonstration on the life extension of coconut leaf thatch.

* * *

Methods and Techniques in Exploration Geophysics

A four-week training course on Methods and Techniques in Exploration Geophysics was organized by the National Geophysical Research In-

stitute (NGRI), Hyderabad, on behalf of UNESCO and the Government of India, from 1 November to 3 December 1985. Eighth in the series being organized at this institute annually, this course was mainly designed for in-service personnel associated with geological and geophysical exploration programmes. Foreign participants to this course were from Afghanistan, Bangladesh, Nepal, Ghana, Nigeria, Thailand and Iran. The course comprised theory lectures, practicals and a field training programme. The ten-day field programme, held at Jonnagiri in Kurnool District, A.P., was especially organized to expose the participants to field exploration methodology and techniques. □

PERSONNEL NEWS

Dr A.N. Bhaduri appointed Scientist in Director's Grade at IICB

Dr A.N. Bhaduri, Professor, Department of Pharmacy, Jadavpur University, has been appointed Scientist in Director's grade at the Indian Institute of Chemical Biology (IICB), Calcutta, with effect from 15 January 1986.



Dr Bhaduri (born 11 Nov. 1935) took his B.Sc. (Hons) degree in Chemistry from the Calcutta University in 1955, M.Sc. (Tech) degree in Applied Chemistry from the Calcutta University in 1958 and D.Sc. degree in Biochemistry from the University of Michigan in

1963. He worked as a research fellow at the Harvard Medical School from 1963 to 1965 before joining the Department of Pharmacy of the Jadavpur University in 1966 where he became a Professor in 1976 and continued in that position until his present appointment.

Dr Bhaduri has made significant contributions in enzymology. Taking UDP glucose-4-epimerase as a model oxido-reductase, he has intensively studied the molecular mechanisms of catalysis and regulation for this enzyme. His current field of interest is parasite biochemistry.

Dr Bhaduri was a visiting scientist of the Roche Institute of Molecular Biology during 1975-76. He is a recipient of Bhatnagar Award (1979) in biological sciences. He is a Member, Indian National Science Academy; Member, Editorial Board—*J. Biosciences*; Member, Research Advisory Committee, RRL-Jorhat; and Vice-President, Society of Biological Chemists (India). Dr Bhaduri has 30 original publications to his credit and has guided 14 Ph.D. students. He has visited several scientific and research institutions in USA, Sweden, Canada and Australia.

* * *

Dr Varadachari appointed Emeritus Scientist and Chairman MRDF

Dr V.V.R. Varadachari, former Director of the National Institute of Oceanography (NIO), Goa, has been appointed Emeritus Scientist at NIO w.e.f. 2 December 1985. He has also been nominated as Chairman of the Committee on Marine Research and Development Fund (MRDF) constituted by the Department of Ocean Development, Government of India, to evaluate research proposals, to make recommendations and to identify priority areas and institutions for research and development in the area of ocean development.

Appointments/Promotions

At the Central Glass and Ceramic Research Institute (CGCRI), Calcutta, the following have been promoted on

assessment (with effect from the dates given in parentheses):

As Scientist EII

Dr K.P. Srivastava (16 Jan. 1985) and Dr B.C. Sinha (8 May 1985).

As Scientist EI

Shri S.K. Gupta (1 Jan. 1984), Dr D. Ganguli, Shri S.K. Das and Shri R.N. Sinha (all the three from 14 Nov. 1984) and Shri B.B. Nag (29 Dec. 1984).

As Scientist C

Dr S.K. Roy (13 Aug. 1984), Shri S.S. Prasad (16 July 1984), Dr K.K. Dhargupta (29 Aug. 1984), Shri B.R. Biswas (8 Oct. 1984) and Shri B. Mitra (10 Oct. 1984).

As Scientist B

Shri R.B.V. Subramaniam (1 Feb. 1984) (CGCRI Naroda Centre).

As Technical Officer A

Shri A.K. Basu, Shri R. Das, Smt. D. Kundu and Shri P. Roy (all the four from 1 Feb. 1985).

* * *
Dr A.N. Goswami and
Dr B.S. Rawat

Dr A.N. Goswami and Dr B.S. Rawat of the Indian Institute of Petroleum, Dehra Dun, have been jointly awarded for their paper entitled 'Separation of aromatic hydrocarbons through liquid surfactant membranes', the Mrs Channaul Memorial Prize for the best technical paper presented at the 37th Annual Session of the Indian Institute of Chemical Engineers held in December 1984 in New Delhi. The prize was awarded to them during the 38th Annual Session of IICbE in Calcutta in December this year. □

OBITUARIES

Dr V.N. Gogte

Dr V.N. Gogte, Scientist EII, National Chemical Laboratory (NCL), Pune, expired on 12 October 1985.

A recipient of two Ph.D. degrees, one from the University of Bombay and the other from the University of Southampton, Dr Gogte joined NCL as a Pool Officer in 1966. While in UK, he was an associate of Lord Todd, Nobel Laureate, at Cambridge.

His research interests included synthesis of heterocyclic compounds, reaction mechanism and kinetics and synthesis of optically active compounds. He had published more than 90 papers in reputed journals, and edited two books: *New Trends in Heterocyclic Chemistry* (Elsevier, Amsterdam, 1978) and *Profiles in Drug Synthesis* (Gokul Publishers, Bombay, 1983). Both the books received very good comments from members of academic and industrial communities.

Dr Gogte was a recognized post-graduate teacher of Bombay, Poona and Shivaji universities and seven students received their Ph.D. degrees under his guidance. He was also the intermediate guide for more than 20 students. □

Corrigendum

In the note pertaining to promotion of Dr V.K. Venkatesan, the second sentence of third para [CSIR News, 36 (1986), 10] which reads "He along with his coworkers has discussed the existence of polarographic maxima" may be read as "He was a co-author in observing for the first time the polarographic maxima of third kind (the terminology was given by the Academician late Prof. A.N. Frumkin)". □

ANNOUNCEMENTS

Tenth International Congress on Metallic Corrosion

The Central Electrochemical Research Institute (CECRI), Karaikudi, on behalf of the International Corrosion Council will be organizing the Tenth International Congress on Metallic Corrosion (ICMC), in Madras, during 7-11 November 1987.

The contents of the congress will be: Corrosion processes (mechanistic aspects); Environmental effects (atmospheric, underground, biological, ma-

rine, liquid metal, non-aqueous, high temperature, sulphidic and vanadic, molten salts, etc.); Material aspects (composition, microstructure, impurities, defects, etc.); Mechanical effects (stress, fatigue, erosion, cavitation, fretting, embrittlement, etc.); Corrosion control measures (alloying, surface modification, surface coatings, inhibitors, cathodic and anodic protection, design modification, etc.); and Corrosion problems in major industries (fertilizer, petroleum, chemical, power plants, transport, buildings and bridges, food and beverages, metallurgical and marine). There will be plenary lectures and panel discussions on selected topics of interest and importance.

The last date for pre-registration is 30 June 1986, for registration with abstracts 31 December 1986, and for full text of papers 31 March 1987. Further details regarding the congress can be had from: Prof. K.I. Vasu, Chairman, ICMC Organizing Committee and Director, CECRI, Karaikudi 623006.

* * * Workshop and Get-together for Modernization of Sugar Industry Using Electronic Systems

The Central Electronics Engineering Research Institute (CEERI), Pilani, is organizing the title workshop and get-together, to be held sometime in September 1986. The main objective of the proposed workshop and get-together is to establish close interaction and coordination between agencies responsible for the growth and modernization of sugar industry such as CSIR institutions, Department of Electronics, Department of Food and Civil Supplies, Sugar machinery manufacturers and sugar mills to identify the needs of the industry and the specific role which CSIR can play to promote the modernization of this industry using the latest electronic techniques based on microprocessor-based systems.

Topics proposed to be covered in the workshop are: 1. *Process Control*—Juice clarification and evaporation controls; Sugar crystallization including continuous pan boiling; Integrated

sulphur burner control; Temperature data acquisition, monitoring and control; Distributed sugar plant management using distributed control techniques; and Cane management including transportation, weighing and communication. 2. *Energy management*—Boiler instrumentation and control; Energy conservation and cogeneration; Byproduct saving and utilization; Energy conservation at the evaporation and pan boiling stages; 3. *Other Areas*—sensors and actuators; Colour graphic-applications and future trends; Modern-trends in laboratory analysis; and Technoeconomic fallouts.

An exhibition of products/processes developed/being developed for modernization of sugar industry shall also be arranged.

Further details regarding the conference can be had from Shri Trilochan Singh, Organizing Secretary, CEERI, Pilani 333031. □

NOMINATIONS INVITED

Hari Om Ashram Prerit S.S. Bhatnagar Research Award Endowment for Desalination—1985:

The Director, Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, invites applications/nominations from person(s) who have carried out original research work in the field of 'Desalination' for consideration for the above referred award for the year 1985. Two cash awards of Rs 5000 (first prize) and Rs 3000 (second prize) will be given.

The award is open to an Indian citizen/team who has done outstanding original research work during 1980-84. The application in the prescribed pro forma with relevant documentary evidence, may be submitted to the Director, CSMCRI, Gijubhai Badheka Marg, Bhavnagar 364002, before 31 March 1986. The rules and regulations governing the award and the prescribed application form can be had from the Division of Planning and Technical Services (DPTS), CSMCRI, by sending a self addressed stamped envelope (26.5 × 11 cm). □



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VOL. 36 NO. 5 15 MARCH 1986

Shanti Swarup Bhatnagar Prizes for 1982-84 Presented

Thirty-four distinguished scientists received Shanti Swarup Bhatnagar Prizes for Science and Technology, for the years 1982, 1983 and 1984 from Shri Rajiv Gandhi, Prime Minister, and President, CSIR, at a function held in Vigyan Bhavan, New Delhi, on 27 February 1986. Each awardee received Rs 20,000, citation and a scroll.

Addressing the recipients of the Shanti Swarup Bhatnagar Prizes, Shri Rajiv Gandhi stressed the need for a broad-based study of science in the country. Referring to the need of a strategy for preparedness for the 21st century, the Prime Minister called upon

the scientists to do 'top grade' work and compete with scientists of the advanced countries. This called for some selective work. Only such areas should be selected for work that were needed for the speedier development of the country such as drinking water, oil seeds, biotechnology and energy. Research in the field of 'blue-sky' area should be confined to the fundamentals.

The CSIR President further said that despite the availability of good infrastructure in the country, the range from which the country could draw talents was very narrow. Efforts should therefore be made to create the right

type of environment to encourage more people to take up the study of science and technology. The best intellects should be brought into the field of work. What counted ultimately was the better institutional management and creation of scientific temperament in the working of every department.

Earlier, Minister of State for Science & Technology, Shri Shivraj V. Patil, who is also the Vice President of CSIR, in his welcome address said that attempts were being made to bring about development in all fields so that the aim to alleviate penury was fulfilled.

Union Energy Minister, Shri Vasant Sathe also attended the function.

Dr A.P. Mitra, Director General, CSIR and Secretary, Department of Scientific & Industrial Research, read out the citations, which are reproduced below:

CITATIONS

Prof. G. S. Agarwal

The Shanti Swarup Bhatnagar Prize for the year 1982 in Physical Sciences has been awarded to Prof. Girish Saran Agarwal, University of Hyderabad, Hyderabad, along with Prof. Tiruppattur Venkatachalamurti Ramakrishnan, Indian Institute of Science, Bangalore.

Prof. Agarwal's work in optics and the master equation approach for laser theory have attracted international recognition. His recent major



Shri Rajiv Gandhi addressing the recipients of Shanti Swarup Bhatnagar Prizes. Others on the dais are: Dr A.P. Mitra, DG, CSIR (extreme left); and Shri Shivraj V. Patil, Minister of State for Science & Technology, and Vice President, CSIR (extreme right)

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CSIR participates in Indian trade exhibition in Paris	36
Dr R.K. Bhandari appointed CBRI Director	38

RECIPIENTS OF THE SHANTI SWARUP BHATNAGAR PRIZE

1982



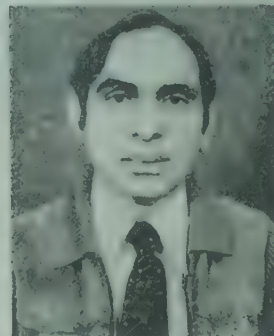
Prof. Girish Saran Agarwal



Prof. T. V. Ramakrishnan



Prof. C. L. Khetrapal



Prof. G. S. R. Subba Rao



Dr. S. S. Kapoor



Prof. Ramamurti Rajar



Dr. R. Jayaraman



Dr. S. K. Podder



Prof. B. L. S. Prakasa Rao



Prof. J. B. Shukla



Dr. K. Kasturirangan



Prof. S. P. Sukhatme



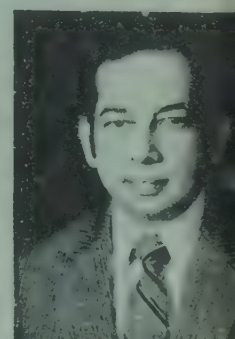
Dr. R. A. Mashelkar



Dr. Kunchithapadam Gopalan



Dr. S. M. Naqvi



Dr. Harsh K. Gupta

contributions are on the study of effect of temporal laser fluctuations on resonance fluorescence, theory of optical bistability, strong field effects on resonant Raman scattering and study of light scattering from rough surfaces. He has also contributed significantly to the quantum theory of optical Hanle effect, subnatural linewidth spectroscopy and to the theory of phase transitions in systems far from equilibrium. [For a detailed account of Prof. Agarwal's prize-winning work see *CSIR News*, 34 (1984), 48.]

Prof. C.L. Khetrapal

The Shanti Swarup Bhatnagar Prize for the year 1982 in Chemical Sciences has been awarded to Prof. Chinni Lal Khetrapal, Raman Research Institute, Bangalore, along with Prof. Ganugapati Sree Rama Subba Rao, Indian Institute of Science, Bangalore.

Prof. Khetrapal has done pioneering work on NMR spectroscopy of molecules oriented in the nematic phase of liquid crystals. He has done

commendable work on non-planar distortions in peptides in the liquid phase. He has also made significant contribution to the spectroscopic investigation of weak molecular interactions like those involved in hydrogen bonding. [For a detailed account of Prof. C.L. Khetrapal's prize-winning work see *CSIR News*, 34 (1984), 20.]

Prof. T.V. Ramakrishnan

The Shanti Swarup Bhatnagar Prize for the year 1982 in Physical Sciences has been awarded to

10 MAY 1986

AR PRIZES FOR SCIENCE AND TECHNOLOGY

1984

F. T. R. I., MYSORE



Prof. S. Mitra



Prof. N. K. Ray



Prof. R. Cowsik



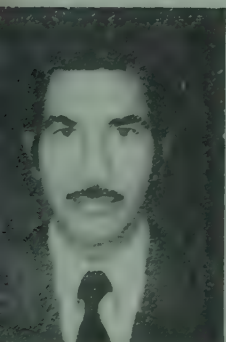
Prof. R. Shashidhar



Prof. P. Natarajan



Prof. K. J. Rao



Prof. I. B. Singh Passi



Prof. Phoolan Prasad



Dr. D. D. Bhawalkar



Dr. P. Ratnasamy



Dr. J. N. Sinha



Dr. B. S. Srivastava



Prof. G. Padmanaban



Dr. Indira Nath



Dr. S. K. Acharyya



Dr. S. Krishnaswami



Prof. T. J. Pandian

Photograph of
Dr. Easwaran
could not be
procured

Prof. Tiruppattur Venkatachalamurti Ramakrishnan, Indian Institute of Science, Bangalore, along with Prof. Girish Saran Agarwal, University of Hyderabad, Hyderabad.

Prof. Ramakrishnan's contributions to the theory of liquid to solid transition and of mixed valence systems are novel, stimulating and significant. His theory of freezing is a simple and quantitative treatment of the phenomenon as a first order structural transition in dense classical systems and has stimulated a lot of further work.

His contributions to the well known scaling theory of electron localization are significant. [For a detailed account of Prof. Ramakrishnan's prize-winning work see *CSIR News*, 34 (1984), 57.]

Prof. G.S.R. Subba Rao

The Shanti Swarup Bhatnagar Prize for the year 1982 in Chemical Sciences has been awarded to Prof. Ganugapati Sree Rama Subba Rao, Indian Institute of Science, Bangalore, along with Prof.

Chunni Lal Khetrapal, Raman Research Institute, Bangalore.

Prof. Subba Rao has developed new syntheses of natural products based on dihydroaromatics obtained through Birch reduction of aromatic compounds. He has made ingenious use of these for synthesis of steroids and polyketides. He has also investigated the mechanistic aspects of dissolving metal reductions. [For a detailed account of Prof. Subba Rao's prize-winning work see *CSIR News*, 34 (1984), 33.]

Dr R. Jayaraman

The Shanti Swarup Bhatnagar Prize for the year 1982 in Biological Sciences has been awarded to Dr Ramamirtha Jayaraman, Madurai Kamaraj University, Madurai, along with Prof. Sunil Kumar Podder, Indian Institute of Science, Bangalore.

Dr Jayaraman has made outstanding contributions to the genetics of bacteria in relation to control of transcription. His studies have provided direct genetic evidence of the participation of accessory factors in transcription. His contributions also include interactions of these factors with RNA polymerase. [For a detailed account of Dr R. Jayaraman's prize-winning work see *CSIR News*, 34 (1984), 21.]

Prof. S.K. Podder

The Shanti Swarup Bhatnagar Prize for the year 1982 in Biological Sciences has been awarded to Prof. Sunil Kumar Podder, Indian Institute of Science, Bangalore, along with Dr Ramamirtha Jayaraman, Madurai Kamaraj University, Madurai.

Prof. Podder has made outstanding contributions to the chemical specificity of the recognition process in biological systems. He has demonstrated that specificity can be expressed quantitatively in terms of free energy of association of amino acids of proteins with nucleic acid bases. His contribution also includes protein-carbohydrate interaction in a model membrane system. [For a detailed account of Prof. S.K. Podder's prize-winning work see *CSIR News*, 34, (1984), 28.]

Dr R.A. Mashelkar

The Shanti Swarup Bhatnagar Prize for the year 1982 in Engineering Sciences has been awarded to Dr Raghunath Anant Mashelkar, National Chemical Laboratory, Pune.

Dr Mashelkar has done outstanding work in several areas of polymer science and engineering. He has made original and pioneering contributions in transport phenomena in macromolecular media. His work in reaction engineering, particularly for polycondensation reactors, is novel and has been applied in an imaginative way in industry. [For a detailed account of Dr Mashelkar's prize-winning work see *CSIR News*, 34(1984), 47.]

Prof. B.L.S. Prakasa Rao

The Shanti Swarup Bhatnagar Prize for the year 1982 in Mathematical Sciences has been awarded to Prof. Bhagavatula Lakshmi Surya Prakasa Rao, Indian Statistical Institute, New Delhi, along with Prof. Jang Bahadur Shukla, Indian Institute of Technology, Kanpur.

Prof. Prakasa Rao has made significant contributions to the field of statistical inference in

stochastic processes. In his earlier work he had extended the Bernstein-von-Mises rates of convergence for independent variables to discrete parameter stationary Markov processes. He has developed the theory of large sample tests and estimation for general stochastic processes, and has investigated large sample properties of maximum probability, maximum likelihood and Bayes estimates for diffusion processes. In recent years, Dr Prakasa Rao has, among other works obtained very significant results in the asymptotic theory of statistical inference in stochastic processes and non-parametric density estimation. [For a detailed account of Prof. Prakasa Rao's prize-winning work see *CSIR News*, 34(1984), 36.]

Prof. J.B. Shukla

The Shanti Swarup Bhatnagar Prize for the year 1982 in Mathematical Sciences has been awarded to Prof. Jang Bahadur Shukla, Indian Institute of Technology, Kanpur, along with Prof. Bhagavatula Lakshmi Surya Prakasa Rao, Indian Statistical Institute, New Delhi.

Prof. Shukla had proposed a new deterministic theory to study the effect of surface roughness in lubrication which was considered a breakthrough. His contributions to Biofluid dynamics and in particular, to peristaltic transport of faeces in intestines and on the interaction of biorheological aspects of blood flow and arterial stenosis have been very significant. Prof. Shukla has also made important contributions to the area of population dynamics of interacting species and mathematical theory of epidemics by taking into account environmental effects. His work on mathematical models on air pollution is well recognized. [For a detailed account of Prof. J.B. Shukla's prize-winning work see *CSIR News*, 34 (1984), 27.]

Dr K. Gopalan

The Shanti Swarup Bhatnagar Prize for the year 1982 in Earth Sciences has been awarded to Dr Kunchithapadam Gopalan, Physical Research Laboratory, Ahmedabad.

Dr Gopalan has done pioneering work in establishing the chronologies of several critical rock suites of the Indian subcontinent through indigenous development of high precision mass spectrometer facilities, and meticulous design of experiments. The establishment of the ages of solid bodies in the solar system, of basaltic volcanism in the sea of Tranquility on the moon, and of granite activity in three distinct phases in the Precambrians of Rajasthan and elucidation of the stratigraphic relations of the Precambrians of Madhya Pradesh are some of the significant contributions made by him. [For a detailed account of Dr Gopalan's prize-winning work see *CSIR News*, 34 (1984), 49.]

Dr S.S. Kapoor

The Shanti Swarup Bhatnagar Prize for the year 1983 in Physical Sciences has been awarded to Dr

Shyam Sunder Kapoor, Bhabha Atomic Research Centre, Bombay, along with Prof. Ramamurti Rajaraman, Indian Institute of Science, Bangalore.

Dr Kapoor has made significant experimental contributions to the field of fission and heavy ion physics. He has studied light charged particles emitted in fission to probe characteristics of large scale nuclear motion. He has also obtained important correlations between the fragment mass, charge and total kinetic energy in binary fission. He has established a new type of nuclear splitting process which proceeds on a fast time scale. [For a detailed account of Dr S.S. Kapoor's prize-winning work see *CSIR News*, 35 (1985), 3.]

Prof. R. Rajaraman

The Shanti Swarup Bhatnagar Prize for the year 1983 in Physical Sciences has been awarded to Prof. Ramamurti Rajaraman, Indian Institute of Science, Bangalore, along with Dr Shyam Sunder Kapoor, Bhabha Atomic Research Centre, Bombay.

Prof. Rajaraman has had a consistently high record of contributions to many areas of theoretical physics. These range from nuclear theory through statistical mechanics to particle physics and quantum field theory. His work on three and n-body clusters in nuclear matter and liquid He-3, and on nonperturbative methods in quantum field theory, are particularly well-known. He has also shown great skill as an expositor of newly emerging concepts, such as solitons and instantons, to wide audiences. [For a detailed account of Prof. R. Rajaraman's prize-winning work see *CSIR News*, 35 (1985), 44.]

Prof. S. Mitra

The Shanti Swarup Bhatnagar Prize for the year 1983 in Chemical Sciences has been awarded to Prof. Samaresh Mitra, Tata Institute of Fundamental Research, Bombay, along with Prof. Naba Kishore Ray, University of Delhi, Delhi.

Prof. Mitra has distinguished himself by his original contributions to the study of inorganic paramagnetic complexes like metalloporphyrins and low-symmetry transition metal complexes using the technique of single crystal magnetic anisotropy and NMR. These studies have led to a better understanding of the electronic structure of these systems. He has contributed significantly to the measurement of single crystal susceptibilities and in general to magnetochemistry. [For a detailed account of Dr S. Mitra's prize-winning work see *CSIR News*, 35 (1985), 9.]

Prof. N.K. Ray

The Shanti Swarup Bhatnagar Prize for the year 1983 in Chemical Sciences has been awarded to Prof. Naba Kishore Ray, University of Delhi, Delhi, along with Prof. Samaresh Mitra, Tata Institute of Fundamental Research, Bombay.

Prof. Ray has distinguished himself by his contributions to the area of Quantum Chemistry. His studies using molecular orbital and floating spherical gaussian orbital methods have led to a better understanding of the structures and reactivities of several interesting molecules. Prof. Ray's theoretical studies have also dealt with the nature of electron density and momentum distribution in atoms and molecules. His studies on reactivities of molecules on surfaces have thrown considerable light on the details of the interactions involved. [For a detailed account of Prof. N.K. Ray's prize-winning work see *CSIR News*, 35 (1985), 11.]

Prof. G. Padmanaban

The Shanti Swarup Bhatnagar Prize for the year 1983 in Biological Sciences has been awarded to Prof. Govindarajan Padmanaban, Indian Institute of Science, Bangalore.

Prof. Padmanaban's work on hemoprotein biosynthesis is outstanding. He has contributed to the understanding on the regulation of the biosynthesis of cytochrome P-450 and of cytochrome oxidase. His work has also been of importance in elucidating the molecular basis of drug metabolism. [For a detailed account of Prof. G. Padmanaban's prize-winning work see *CSIR News*, 34 (1984), 175.]

Dr K. Kasturirangan

The Shanti Swarup Bhatnagar Prize for the year 1983 in Engineering Sciences has been awarded to Dr Krishnaswamy Kasturirangan, ISRO Satellite Centre, Bangalore, along with Prof. Suhas Pandurang Sukhatme, Indian Institute of Technology, Bombay.

Dr Kasturirangan has made original contributions to the development of Satellite Technology. He has made significant contributions to the design and development of the two experimental remote sensing satellites which have become the forerunner for the semi-operational sensing satellite IRS. He has made original contributions in the field of high energy astronomy, particularly in the areas of X-ray and gamma-ray astronomy using satellite and rocket based instrumentation. [For a detailed account of Dr K. Kasturirangan's prize-winning work see *CSIR News*, 34 (1984), 176.]

Prof. S.P. Sukhatme

The Shanti Swarup Bhatnagar Prize for the year 1983 in Engineering Sciences has been awarded to Prof. Suhas Pandurang Sukhatme, Indian Institute of Technology, Bombay, along with Dr Krishnaswamy Kasturirangan, ISRO Satellite Centre, Bangalore.

Prof. Sukhatme has made outstanding contributions to the area of heat transfer. He has developed and tested an original theory of interfacial resistance for heat transfer during film

condensation of liquid metal vapours. He has studied the local and average heat transfer around circular tubes and various fin arrays under the influence of free and forced convection. He has also developed faster methods for measuring the thermal conductivity of slab insulations. Prof. Sukhatme's work in these and other areas of heat transfer and thermodynamics has been widely recognised. [For a detailed account of Prof. S.P. Sukhatme's prize-winning work see *CSIR News*, 35 (1985), 35.]

Dr Indira Nath

The Shanti Swarup Bhatnagar Prize for the year 1983 in Medical Sciences has been awarded to Dr Indira Nath, All India Institute of Medical Sciences, New Delhi.

Dr Indira Nath has studied the immunological mechanisms involved in various types of leprosy and contributed to basic understanding of the cellular mechanisms regulating natural immunity in human form of the disease. Development of a new in-vitro radiometric assay using macrophages has provided a rapid method for screening anti-leprosy drugs, drug resistance and immunologically-mediated microbicidal activity. [For a detailed account of Dr Indira Nath's prize-winning work see *CSIR News*, 35 (1985), 19].

Prof. I.B.S. Passi

The Shanti Swarup Bhatnagar Prize for the year 1983 in Mathematical Sciences has been awarded to Prof. Inder Bir Singh Passi, Panjab University, Chandigarh, along with Prof. Phoolan Prasad, Indian Institute of Science, Bangalore.

Prof. Passi is one of the few noted group-theorists in India. He has made significant contribution to certain aspects of theory of groups, specially to the study of group-rings in which he is a leading expert in the world. His results on the dimension subgroups, augmentation powers in group-rings, and related problems, have received wide recognition. His 1979 monograph summarizing the state of the subject is a basic source of reference. [For a detailed account of Prof. I.B.S. Passi's prize-winning work see *CSIR News*, 35 (1985), 20.]

Prof. Phoolan Prasad

The Shanti Swarup Bhatnagar Prize for the year 1983 in Mathematical Sciences has been awarded to Prof. Phoolan Prasad, Indian Institute of Science, Bangalore, along with Prof. Inder Bir Singh Passi, Panjab University, Chandigarh.

Prof. Phoolan Prasad has made outstanding research contribution to the area of non-linear hyperbolic equations. He has succeeded in getting the basic properties of the equations of various physical phenomena, generalised these mathematical properties and then used his theory to explain new results in the field of non-linear waves.

He has given the proof of the existence of a new type of wave on the interface of a clear liquid and a

mixture in a sedimentation process and this is confirmed by recent experiments. [For a detailed account of Prof. Phoolan Prasad's prize-winning work see *CSIR News*, 34 (1984), 183.]

Dr H.K. Gupta

The Shanti Swarup Bhatnagar Prize for the year 1983 in Earth Sciences has been awarded to Dr Harsh Kumar Gupta, Centre for Earth Science Studies, Trivandrum, along with Dr Syed Mahmood Naqvi, National Geophysical Research Institute, Hyderabad.

Dr Gupta has made significant contributions to Seismology, notably to Reservoir-Induced Seismicity, which are compiled into his well-known book 'Dams and Earthquakes'. He also produced the first results on the crustal structure of the Himalayan region using surface wave dispersion, giving a crustal thickness of 70 km. [For a detailed account of Dr H.K. Gupta's prize-winning work see *CSIR News*, 35 (1985), 27.]

Dr S.M. Naqvi

The Shanti Swarup Bhatnagar Prize for the year 1983 in Earth Sciences has been awarded to Dr Syed Mahmood Naqvi, National Geophysical Research Institute, Hyderabad, along with Dr Harsh Kumar Gupta, Centre for Earth Science Studies, Trivandrum.

Dr Naqvi has made important contributions to the Precambrian Geology of South India by sustained field and laboratory studies. He demonstrated the importance of basic and ultrabasic rocks in the formation of the primitive crust in South India. He has drawn attention to the presence of lunar-type anorthosite in the terrain. His geological-geochemical research work will help in a better understanding of the evolution of the South Indian Archaean Craton. [For a detailed account of Dr S.M. Naqvi's prize-winning work see *CSIR News*, 35 (1985), 4.]

Prof. R. Cowsik

The Shanti Swarup Bhatnagar Prize for the year 1984 in Physical Sciences has been awarded to Prof. R. Cowsik, Tata Institute of Fundamental Research, Bombay, along with Prof. R. Shashidhar, Raman Research Institute, Bangalore.

Prof. Cowsik has made outstanding contributions to theoretical astrophysics, especially in obtaining useful bounds on important particle physics parameters such as neutrino masses and their radiative decays by means of cosmological considerations, and to the theory of cosmic ray propagation.

Prof. R. Shashidhar

The Shanti Swarup Bhatnagar Prize for the year 1984 in Physical Sciences has been awarded to Prof. R. Shashidhar, Raman Research Institute,

Bangalore, along with Prof. R. Cowsik, Tata Institute of Fundamental Research, Bombay.

Prof. Shashidhar has made outstanding contributions to the experimental physics of liquid crystals, especially at high pressures. He has studied a variety of new phenomena like re-entrant polymorphism, and universality of multi-critical points, which are of considerable significance in modern condensed matter physics.

Prof. P. Natarajan

The Shanti Swarup Bhatnagar Prize for the year 1984 in Chemical Sciences has been awarded to Prof. P. Natarajan, University of Madras, Madras, along with Prof. K.J. Rao, Indian Institute of Science, Bangalore.

Prof. Natarajan has distinguished himself by his contributions to the photochemistry of coordination compounds, especially in the study of excited states by transient techniques. His work on the utilisation of macromolecular dye coatings for stabilization of electrodes in photoelectrochemical cells is also noteworthy.

Prof. K.J. Rao

The Shanti Swarup Bhatnagar Prize for the year 1984 in Chemical Sciences has been awarded to Prof. K.J. Rao, Indian Institute of Science, Bangalore, along with Prof. P. Natarajan, University of Madras, Madras.

Prof. Rao has made outstanding contributions to the physical chemistry of glasses. He has provided novel structural models for ionic glasses and has investigated a variety of glass systems by employing sophisticated techniques including EXAFS. He has also proposed a model for the glass transition. He has recently carried out an excellent work on fast ion conducting glasses.

Dr K.R.K. Easwaran

The Shanti Swarup Bhatnagar Prize for the year 1984 in Biological Sciences has been awarded to Dr K.R.K. Easwaran, Indian Institute of Science, Bangalore, along with Prof. Thavamani J. Pandian, Madurai Kamaraj University, Madurai.

Dr Easwaran has made outstanding contribution to the area of conformational, mechanistic and kinetic aspects of transmembrane ion transport mediated by carrier ionophores which has led to a possible model at molecular level for transmembrane cation transport.

Prof. T.J. Pandian

The Shanti Swarup Bhatnagar Prize for the year 1984 in Biological Sciences has been awarded to Prof. Thavamani J. Pandian, Madurai Kamaraj University, Madurai along with Dr K.R.K. Easwaran, Indian Institute of Science, Bangalore.

Prof. Pandian has made outstanding contributions to the fields of bioenergetics and animal ecology and has developed a prediction model for

transformation of food energy into growth and metabolism.

Dr D.D. Bhawalkar

The Shanti Swarup Bhatnagar Prize for the year 1984 in Engineering Sciences has been awarded to Dr D.D. Bhawalkar, Bhabha Atomic Research Centre, Bombay, along with Dr Paul Ratnasamy, National Chemical Laboratory, Pune.

Dr Bhawalkar has made outstanding contribution to the area of high power glass lasers and their applications in laser produced plasmas. This work is of great significance for the advancement of fusion research in the country.

Dr P. Ratnasamy

The Shanti Swarup Bhatnagar Prize for the year 1984 in Engineering Sciences has been awarded to Dr Paul Ratnasamy, National Chemical Laboratory, Pune, along with Dr D.D. Bhawalkar, Bhabha Atomic Research Centre, Bombay.

Dr Ratnasamy has discovered novel zeolite catalysts having applications in major processes for the production of hydrocarbons such as para xylene, ethyl benzene and light olefins. Dr Ratnasamy's outstanding research in applied catalysis has both proven and potential impact in petroleum refining and petrochemical industry.

Dr J.N. Sinha

The Shanti Swarup Bhatnagar Prize for the year 1984 in Medical Sciences has been awarded to Dr J.N. Sinha, K.G. Medical College, Lucknow, along with Dr B.S. Srivastava, Central Drug Research Institute, Lucknow.

Dr Sinha has made outstanding contributions to delineate the neurochemical modulation of medullary "baroreceptor reflex" by studying the nature and function of the receptors and the primary pathways involved.

Dr B.S. Srivastava

The Shanti Swarup Bhatnagar Prize for the year 1984 in Medical Sciences has been awarded to Dr B.S. Srivastava, Central Drug Research Institute, Lucknow, along with Dr J.N. Sinha, K.G. Medical College, Lucknow.

Dr Srivastava has done outstanding work in the field of microbial genetics using strains of *Vibrio cholerae*. He has developed bacterial mutants using genetic techniques and got plasmid-induced loss of virulence and characterised antigens for adherence. The strains thus obtained have potential of being used for vaccine development.

Dr S.K. Acharyya

The Shanti Swarup Bhatnagar Prize for the year 1984 in Earth Sciences has been awarded to Dr S.K. Acharyya, Geological Survey of India, Calcutta, along with Dr S. Krishnaswami, Physical Research Laboratory, Ahmedabad.

Dr Acharyya has made outstanding contribution to developing an integrated model of evolution of the Himalaya and the Indo-Burmese mobile belt, particularly a concept of thin-skin overthrusting of premetamorphosed rocks over Mesozoic-Tertiary arc-trench sediments of the Indian plate. His work has provided important impetus to concept-oriented exploration for hydrocarbons and other mineral resources in the Himalayas.

Dr S. Krishnaswami

The Shanti Swarup Bhatnagar Prize for the year 1984 in Earth Sciences has been awarded to Dr S. Krishnaswami, Physical Research Laboratory, Ahmedabad, along with Dr S.K. Acharyya, Geological Survey of India, Calcutta.

Dr Krishnaswami has made outstanding contributions to establishing the accretion rate and growth history of ocean-floor ferromanganese nodules by application of radio-nuclides. Using this method he has also successfully determined the recent history of sedimentation in lakes and coastal environments.

Fifth Annual Conference of Society of Toxicology (India)

The title conference was sponsored and organized by the Industrial Toxicology Research Centre, Lucknow, during 1-3 November 1985. More than 250 delegates consisting of eminent toxicologist from the country and from abroad participated in the deliberations.

Dr P.K. Ray, Director, ITRC and Chairman, Organizing Committee, in his welcome address described toxicology as multidisciplinary science which could give guidance and render help in all fields of activities. Dr K.K.G. Menon, Vice President (Research), Hindustan Lever, while inaugurating the conference, suggested that a balanced judgement of experienced toxicologist is needed for handling hazards of industrial and environmental chemicals. Prof. B.B. Sethi, Principal, K.G. Medical College, Lucknow, who presided over the inaugural function stressed the importance of behavioural science in toxicology. Prof. W.W. Schunk, Director, Institute of Occupational Medicine, Erfurt, GDR, who has rich experience of thuringamines,

delivered a lecture on chronic manganese toxicity.

Symposia were held on carcinogenesis and mutagenesis and on health hazard of industrial agrochemicals. There were eight sessions which included platform and poster presentations on toxicity of agrochemicals, metals, environmental chemicals and genotoxicity. □

Symposium on analytical instrumentation and techniques in electrochemistry

A three-day symposium on 'Analytical Instrumentation and Techniques in Electrochemistry' was organized by the Central Electrochemical Research Institute (CECRI), Karaikudi, during 5-7 December 1985. The symposium was organized with a view to highlighting the importance of instrumentation in all branches of electrochemical research and industry, and to discussing the recent electrochemical techniques. Instrumentation relating to metal finishing, power sources, corrosion, electrometallurgy, electrochemicals, electroanalysis was covered.

One hundred and ninety delegates participated in the symposium: 67 papers were presented during six sessions.

An added feature of the symposium was an exhibition of sophisticated instruments displayed by manufacturers of electrochemical equipment. A pre-conference session was also arranged in the form of the 'First National Meet of Electrochemistry Students'. □

Zirconia-alumina abrasives

The Central Electrochemical Research Institute (CECRI), Karaikudi, has determined experimental conditions for the preparation of commercially acceptable grade of zirconia-alumina abrasive material in a 60 kVA arc furnace. Zirconia is obtained from beach sand and alumina from bauxite.

The product possesses good strength, hardness and sharpness and is suitable

for high pressure, large stock removal in ferrous metal grinding operations. It can also be used for heavy duty grinding and light duty applications. It is not made in the country at present. □

Behaviour of multibulb piles in difficult soils of India

The Central Building Research Institute (CBRI), Roorkee, carried out a field study, in collaboration with the Building Research Establishment, UK, on the CBRI's instrumented under-reamed piles technique which the institute had developed for problematic black cotton soil deposits covering about one-fifth of land area of the country. The study yielded: (a) mechanism of load transfer through such piles reflecting the effect of change in sub-soil characteristics on pile behaviour on account of moisture variation during various seasons of the year, (b) data on performance of these piles under actual structure, and (c) proven technology of monitoring field behaviour of pile foundations through the medium of instrumentation, particularly through modular vibrating wire load cells. The field data collected would help revise the India Standard Code of Practice on 'Under-reamed Piles' and introduce improved design methodology of these piles. The study is first of its kind in India and the instrumentation methodology developed during this study holds great promise for wide spread application to monitor performance of actual foundations placing design methodologies on scientific basis. □

Demonstration of modern oil burning equipment for aluminium industry

One of the major problems facing the aluminium utensils manufacturing industry, concentrated mainly in Rajahmundry, is the high cost of processing. The CSIR-Polytechnology Transfer Centre (PTC), Hyderabad, has undertaken, at the request of Government of

Andhra Pradesh, a project on improvements in aluminium melting furnace employed for the manufacture of aluminium utensils to bring down the cost of production. With a view to convincing the manufacturers to install more efficient furnaces, PTC-Hyderabad organized a demonstration of the modern equipment of the Heatly & Gresham (India) Ltd, which is based on low air pressure system of oil firing and consumes less furnace oil. The Prakash Rolling Mills at Rajahmundry extended their present facilities for the demonstration. All the members of Aluminium Utensils Manufacturers Association, numbering about 30, along with those who are employing furnace oil for other purposes such as brass melting witnessed the demonstration which was held on 4 December 1985. A representative of the Heatly & Gresham outlined the principles of modern oil-burning devices which would consume less fuel oil. It was observed during the demonstration that nearly 20% of the furnace oil could be saved.

Dr B.R. Sant, Head, PTC-Hyderabad, while addressing the gathering, highlighted the role of his centre in entrepreneurial development, technology transfer and assistance to industries in their modernization programmes and in solving their technological problems. The additional Director of Industries, Shri V.V. Krishna Rao complimented PTC-Hyderabad for their success in the organization of the demonstration and hoped that both industry and the state government will derive more and more benefit from PTC-Hyderabad. Shri G.A.S. Prakasa Rao, President of the Aluminium Utensil Manufacturers Association, Rajahmundry, expressed his gratitude to PTC-Hyderabad for organizing the demonstration. □

NCL and CBRI participate in scientists-entrepreneurs get-together at Latur

The National Chemical Laboratory, Pune, and Central Building Research

Institute, Roorkee, participated in the scientists and entrepreneurs get-together organized by the Marathwada Tantradnya Parishad (Marathwada Technologists Forum) at Latur from 8 to 10 December 1985. The programme consisted of an exhibition and a conference. NCL organized a display at the exhibition under the title, 'NCL's Contribution to Indian Agriculture'. The exhibits consisted of panels and samples pertaining to agrochemicals, controlled release pesticides, *Jalshakti*, grape guard, plant tissue culture,

polymers from renewable resources (castor oil and cashew nut shell liquid), quinapyramine sulphate and other major technologies developed by NCL.

The CBRI processes which attracted the entrepreneurs, included those related to bricks from black and red soils, semi-mechanized brick and tile making table, high draught kiln, improved brick and tile making table, low cost rural housing including prefabricated brick roofing units, non-erodeable mud plaster and thatch roof. □

CSIR participates in Indian Trade Exhibition in Paris

The Council of Scientific & Industrial Research participated in the Indian Trade Exhibition organized in Paris during 6-15 December 1985 by the Trade Fair Authority of India, in the context of Festival of India in France. Many scientific organizations, including Department of Atomic Energy, Department of Space, Department of Electronics, Department of Science and

Technology (National Atlas Organisation), Department of Non-conventional Energy Sources and NRDC along with CSIR displayed their exhibits in the theme area of the fair. The exhibition was organized at Parc-Des-Expositions Batinent (Paris Exhibition Complex), Paris.

Mr Hubert Curien, Minister of Energy and Technology, France, in-

augurated the exhibition. Shri M. Arunachalam, Minister of State for Industries, Government of India, was the Chief Guest. Shri Mohammad Yunus, Chairman, TFAI and Air Chief Marshal I.H. Latif, Indian Ambassador in France were present at the inaugural function.

Mr Curien, along with Shri Arunachalam and Shri Yunus, was taken round the exhibition, and was explained the activities of CSIR and the recent scientific and industrial research efforts in India/CSIR directed towards meeting the needs of the country and towards developing modern technologies relevant to industrial development of the country.

The Minister, in his address, stated that he was familiar with the long tradition of Indian science, specially in the field of mathematics and statistics as a part of philosophical studies. He expressed his happiness over the efforts of modern India towards the development of science and technology consistent with the modern needs for the industrial development of the country.

Some 5000 people from various strata of the society visited CSIR science pavilion and envisaged keen interest in the exhibits, specially those on herbal drugs, and essential oils, crystal glass and optical lenses. □

Studies on cellulases

Shri R.V. Patil of the National Chemical Laboratory, Pune, carried out the purification, characterization of the physico-chemical and enzyme properties, and the evaluation of the mode of action of a third endoglucanase, Endo C and a cellobiohydrolase (CBH) obtained from *Sclerotium rolfsii*. The two enzymes obtained were pure glycoproteins. Both the enzymes were found to be specific for β -1,4-linkage. Both, the CBH and endoglucanase, were composed of a single polypeptide chain and had no cystine or half-cystine residues. The Endo C had an *Mr* of 78,000 and an *Ip* of 4.51. Comparison of amino acid content of the three endoglucanases,



Mr Hubert Curien, Minister of Energy and Technology, France, is being taken round the CSIR science pavilion in the Indian Trade Exhibition held in Paris. Seen from right are: Dr J.N. Kansal, PRO, CSIR; Shri Bhargava, NRDC; Shri Mohammad Yunus, Chairman, TFAI; Mr Curien; Shri N. Sen, Joint Adviser, CSIR.

purified from *S. rolfsii* and their subunit structure precluded derivation of one from the other by addition or deletion of polypeptides or polysaccharides. The CBH was found to contain 7% carbohydrate and had an *Mr* of 41,500 and an *I_p* of 4.32.

The CBH was shown to have, in addition, an endo-type mode of action. Reconstitution experiments showed that the synergistic effect for the solubilization of Avicel, cotton, and H₃PO₄-swollen cellulose is greater when CBH is acting in concert with endoglucanase as compared to that with a mixture of endoglucanase and β -glucosidases and least in the case of a mixture of CBH and β -glucosidases. Biochemical data suggested that it is the CBH and not an endoglucanase which initiates the attack on crystalline cellulose. The endoglucanase initiates the attack on amorphous cellulose.

The major route of glucose formation from cellulose in *S. rolfsii* was, therefore, proposed to be through β -glucosidases from higher molecular weight cellodextrins produced by endoglucanases.

Shri Patil worked under the supervision of Dr J.C. Sadana and was awarded Ph.D. by the University of Poona for his thesis based on these studies. □

PROGRESS REPORTS

NIO Annual Report: 1984-85

The National Institute of Oceanography (NIO), Goa, has brought out its annual report for the period January 1984-March 1985. According to the report the institute's activities were reorganized during the period: the research activities were brought under 11 major projects; a new division of Planning and Training was formed, particularly for the training of young oceanographers; the TDC-316 computer was attached to the Marine Instrumentation Division.

NIO continued to participate in the Antarctic Expedition programme. A

scientist from NIO, who stayed for a year at India's manned station at Dakshin Gangotri, returned. Three NIO scientists were included in the fourth expedition.

RV *Gāveshani* undertook twenty-five cruises including three cruises in the EEZ of Seychelles at the request of the Government of Seychelles. ORV *Sagar Kanya* undertook ten cruises mostly for survey of nodules in the Indian Ocean. The vessel was also used for undertaking a comprehensive study of the monsoon and postmonsoon conditions in the Bay of Bengal. A strong upwelling in the southern Bay of Bengal off the east coast of India was noticed. An analysis of the data on the oceanographic conditions of the East African coastal current areas showed that the current was stronger along its northern part.

Studies on the mixed layer along a strip from the Southwest coast of India to Somalia suggested that the horizontal advection during the southwest monsoon provided the needed transport mechanism for the accumulated heat. Remote sensing techniques indicated an intense upwelling off the Somali coast. An experimental solar pond was operated. A laboratory model of a portable breakwater system was designed.

Picoplankton was found to contribute 20 to 25% of the biomass in the northern Arabian Sea. A new species of *Coelosira* was reported from Goa. The deep sea benthos in the central and southern part of the Indian Ocean was found to be diverse, rich and productive. In the Coral Atolls in the Minicoy lagoon, the benthic fauna was found to be related to the density and biomass of the turtle grass. The culture, breeding and growth studies on edible oyster, shrimp and mullets were successfully undertaken. During microbiological studies, luminiscent bacteria were detected in fish samples from Goa waters.

Biofouling and corrosion studies were extended on the east coast of India and some panels were exposed in Antarctica

waters as well. The results indicated that sessile barnacles could accumulate trace metals. *Teredo mindanensis* was found to be a new record for Indian waters.

A regeneration model was constructed for *in situ* flux evaluation of trace metals considering theoretical and practical aspects. The fractions responsible for the antifertility activity in some of the organisms were indicated. An Indo-US project on biologically active organisms was taken up.

The institute continued to investigate effects of breakdown products of methyl isocyanate. It also participated in monitoring and containing the oil spill due to the accident on M.T. *Lajpatrai* off Bombay in October-November 1984. A screen sampler for surface micro-layer studies was designed and a new method for extraction of pesticides from sediments using electrolytes was developed.

Geophysical studies were made in the deep sea areas north of Lakshadweep and on the continental shelf off the southwest coast of India. Besides, some magnetic anomaly maps were prepared and major lineaments and basements were identified. Detailed offshore surveys along the Konkan coast were carried out for ilmenite placers. Over 0.7 m. sq. km. of area was surveyed in the Central Indian basin, for nodule deposits.

Paleoclimatic studies indicated an arid climate during the late pleistocene as in other tropical areas. As many as 25 new species of foraminifera were found along the Bombay-Saurashtra coast.

Geochemical investigations of elements such as Al, Fe, Ti, Mn, Zn, Cu and Ni in the sediments of the eastern continental shelf of India showed that all these elements had both detrital and non-detrital components. Oxides of iron and manganese seemed to be the main carriers of major portion of trace elements from fluvial to marine environment.

A facility was developed to transmit oceanographic data from ORV *Sagar Kanya* to NIO through a satellite,

INTELSAT V. Development of a weather station on board RV *Gaveshani* was taken up to collect ground truth data for remotely sensed satellite data. This instrument was designed around INTEL 8086.

Mooring systems were designed for depths up to 100 m and wave rider buoys were successfully deployed off Yanam and Uran and off Bombay High. Simultaneously time series data on waves and meteorological parameters were collected. The software packages, 'DUCHESS' for storm surge model and 'DOLPHIN' for wave hindcasting model, from the Netherlands, were being used for analyzing the data. An analytical model was developed and tested successfully to study shoreline changes at Visakhapatnam.

Marine archaeological investigations were conducted in the water of Dwarka and Bet Dwarka under west coast under an grant-in-aid project. Two significant results of the studies in Dwarka were the discovery of a unique seal of the Indus valley civilization and the identification of submerged structures. In addition to this, many specimens of pottery and other wares were collected.

NIO's Bombay Regional Centre studied the effects of pollutants, particularly oil, on marine organisms in the water of Bombay. The Cochin Centre worked on the growth of prawns. Culture techniques for *Apseudes chilensis*, a feed organism, were developed. At the Regional Centre, Waltair, the emphasis during the year was on geophysical studies. Magnetic anomalies in the Bay of Bengal were computed. Sediment transport and transport of discharged pollutants formed part of the studies of Visakhapatnam harbour.

During the year, 21 new sponsored/grant-in-aid projects were undertaken for which the institute received an amount of over Rs 82 lakh. Consultancy services were also provided to some agencies. Ninety-five research papers were published. □

TRAINING COURSES

Advanced Course on Liquid-Liquid Extraction

A four-day advanced level training course on liquid-liquid extraction technology and engineering was organized by the Indian Institute of Petroleum (IIP), Dehra Dun, during 15-18 January 1986. The course was designed for experienced refinery technologists and design and development engineers. The programme included lectures, design problem solving sessions and pilot plant visits. The course provided a comprehensive coverage of the extraction technologies applied in petroleum processing and petrochemical industries, chemical engineering design, simulation and scale up aspects of extraction columns. Process design of sieve-tray and packed columns and RDC was covered in detail, including the recent developments. The emphasis throughout the course was on the chemical engineering aspects.

The faculty for the course comprised Dr W.J. Korchinsky, Senior Lecturer at the University of Manchester Institute of Science and Technology (UMIST), England, and Dr R. Krishna, Director, IIP. Both the faculty members are actively involved in R&D in the area of liquid-liquid extraction.

Twenty senior chemical engineers from various refineries (HPCL, IOC, BPCL, MRL and CRL), IPCL and UDCT-Bombay, attended the training programme. □

PERSONNEL NEWS

Dr R.K. Bhandari appointed Director, CBRI

Dr Rajendra Kumar Bhandari, Deputy Director, Central Building Research Institute (CBRI), Roorkee, has been appointed director of the institute with effect from 29 January 1986.

Dr Bhandari (born 10 Feb. 1941) is well-known nationally and internationally for his outstanding contri-

butions in the field of geotechnical engineering in general and of geotechnical instrumentation, pile foundation and landslide studies in particular. He



took his bachelor's degree in Civil Engineering from the M.B.M. Engineering College, Jodhpur, in 1962 and his master's degree from the Indian Institute of Technology, Bombay, in 1964. The same year, he joined the Central Road Research Institute, New Delhi, as Scientist B in September 1964. He was the first engineer-recipient of the coveted Science Research Scholarship for the Exhibition of 1851 for 1967-71 during which he obtained D.I.C. from the Imperial College of Science and Technology and a Ph.D. degree from the University of London.

Dr Bhandari joined CBRI as Scientist EI on 9 December 1975 and was appointed Deputy Director on 20 January 1981. He has authored over 70 papers in national and international journals and has provided consultancy on over 100 projects in India. His papers have been awarded by the Institution of Engineers and the Indian Geotechnical Society several times. Dr Bhandari is widely travelled and has delivered seminars at the various universities and institutions in USA, Australia, Austria, Japan, France, UK, USSR and Thailand. He was elected a member of the International Committee on Soil Sampling (1977-81); International Committee on Landslides (1981-85); International Commission on Landslides (1981-85, 1985-90). He was a keynote speaker on Indian Landslides at the Second International Symposium on Landslides held in Tokyo in 1977; at the Japanese National Seminar, Niigatta, in

1977; at the UNESCO's Lithosphere Programme at Alma Ata, USSR, in 1981 and at the IV International Conference on Landslides at Toronto in 1984. He was one of the few Indians to be invited for panel presentations at the 9th International Conference on Soil Mechanics and Foundation Engineering held in Tokyo (1977); 10th International Conference held in Stockholm 1981 and the XI International Conference held in San Francisco 1984. He was invited by the Indian Institute of Technology, Bombay, to deliver the first Triennial Silver Jubilee Lecture on Past, Present & Future of Landslide Studies in India, in August 1984 and has now been invited to deliver the prestigious Indian Geotechnical Society Annual Lecture during the Annual Convention at IIT, Delhi, in December 1986.

Dr Bhandari's earlier researches provide a direct scientific explanation to occurrence of low angle mudslides in stiff fissured clays of the Isle of Wight, Isle of Sheppey and Northern Ireland in UK. The direct evidence of artesian pressures in the mudslides were obtained by him through fullscale piezometric measurements by specially developed stiff diaphragm, transducerized piezometers. The fleet of indigenous instruments developed by him for monitoring displacements, settlements and pore pressures in landslides have received national and international acclamation and hold considerable potential for repetitive applications in monitoring the Himalayan landslides. Equally noteworthy are landslide control systems developed by him utilizing the concept of recycling of hill-waste, slope-wash and colluvium. Research at CBRI under his direction continues on further exploitation of the concept through reinforced earth and gabion technologies. In the field of landslide studies, Dr Bhandari's outstanding contributions include introduction of innovative methods of exploration, simulation studies for characterization of material properties, back analysis for evaluation of failures,

computer-aided stability analyses, design of low cost control systems, instrumentation schemes for monitoring efficacy of control works and introduction of early warning systems on the problematic slopes and cuttings. The researches provide direct input into the programmes on Hill Housing.

His documentation of failures of driven cast-in-place piles has set the tone for further development of precast spliced piling technology at CBRI on which the institute has already filed four patents. He was also CSIR Co-ordinator of major collaborative R&D programme with BRE, UK, on studies of instrumented multi-bulb pile foundations in expansive soils of India.

Dr Bhandari's fundamental studies on marine clays and deep piling are significant. His R&D work on undisturbed sampling of such clays is now part of the International Manual on Sampling in Soft Clays to the writing of which he has contributed as a member of the ISSMFE's International Committee (1977-81). At the IX International Conference on Soil Mechanics in Stockholm in 1981 he was the first to focus attention on applications of frontier technologies of Radar, acoustic emission and hydraulic fracturing in geotechnical engineering practice. He is chiefly responsible for establishing one of the most modern geotechnical engineering laboratory including computerized soil testing and instrumentation facilities at the CBRI.

He is a fellow of the Indian Geotechnical Society; and the Institution of Engineers (India); a Member of the Indian Road Congress; Indian Society of Engineering Geology; Indian Society of Earthquake Technology; Indian Society of Desert Technology and host of other societies and professional bodies. He is chairman of the Soil Engineering Sectional Committee of the Indian Standards Institution; Geotechnical Instrumentation Sub-Committee and member of its Foundation Engineering Sectional

Committee. He is member of the Programme Advisory Committee in Civil Engineering of the Department of Science and Technology and chairman of the Technology Development and Application Group in Geotechnical Engineering.

Dr Bhandari was specially invited to the International Science Council meeting of the UNESCO held at Prague, Czechoslovakia, and was member of the Indian delegation at the First Meeting of the International Standards Organization. He was Academic Visitor to the University of Woollongong, Australia and is currently Consultant to the Department of Environment and the National Industrial Development Corporation.

Dr Bhandari is co-ordinating a major national programme on Eco-Development in the Himalayan Region as well as a project on Industrial Buildings at CBRI. His proposal for establishment of Centre of Excellence under Indira Gandhi Himalayan Environment Institute has been approved by the Department of Environment, Government of India. Initiation of action on this project would pave way for intensification of Mountain Hazard Zonation work and development of human settlements in harmony with nature all along the Himalayan belt.

Recently, the Archaeological Survey of India has sponsored a major programme on the investigations into the sub-structure of Taj Mahal with Dr Bhandari as the co-ordinator.

Appointments/Promotions

At the National Botanical Research Institute (NBRI), Lucknow, the following personnel have been promoted on assessment with effect from the dates given in parentheses:

As Scientist EII

Dr S.D. Khanduja (3 May 1983), Shri B.R. Juneja (28 Oct. 1983) and Dr P.D. Dogra (4 Dec. 1984)

As Scientist EI

Shri K.M. Balapure (11 April 1983), Dr N.C. Pathak (2 May 1983), Shri S.M. Andra (1 July 1983), Shri S.N. Srivastava (15 Feb. 1984), Shri R.N. Ghosh (12 April 1984), Shri A.K. Srivastava (31 July 1984), Dr P.S. Misra (1 Aug. 1984), Shri Satish Chandra (15 Sep. 1984) (retired on 31 Jan. 1985) and Dr M.I.H. Farooqi (10 Dec. 1984)

As Scientist C

Dr (Smt.) Suman Chopra and Dr (Smt.) Mithileash Chaturvedi (both w.e.f. 5 April 1984), Dr A.N. Sharga (28 April 1984), Shri H.P. Srivastava (29 Sept. 1984), Dr S.R. Paul (9 Jan. 1985) and Dr K.K. Singh (29 Jan. 1985).

Honours/Awards

Dr M. Ramaiah

Dr M. Ramaiah, Director, Structural Engineering Research Centre (SERC), Madras, has been awarded the 'Architectural Engineering Division Gold Medal for 84-85' for his paper 'Northlight Shells and Folded Plates' published in the *Journal of Institution of Engineers (India)*, pt. AR 1, January 1985. □

ANNOUNCEMENTS

Annual Convention and Seminar on Recent Trends in Essential Oil, Perfume and Flavour Industry in India

The Regional Research Laboratory (RRL), Jammu, on behalf of the Essential Oil Association of India, is organizing the 29th Annual Convention and Seminar on Recent Trends in Essential Oil, Perfume and Flavour Industry in India, during 16-17 April 1986.

The main activities of the seminar will be inaugural function; plenary lecture; technical session on collection, cultivation and upgrading of aromatic plants; technical session on chemistry and technology of essential oils and general body meeting.

The registration fee for each participant is Rs 100 (Rs 50 for members) till 1 April 1986 and Rs 200 after that. Further details may be had from: Dr S.N. Sobti, Organizing Secretary, 29th Annual Convention, EOAI, RRL-Jammu. □

PATENTS FILED

632/DEL/85: A process for the preparation of novel lanthanum iron silicates

designated as Encilite-2, P. Ratnasamy, Km. S.B. Kulkarni, V.P. Shiralkar, A.N. Kotasthane, and (Smt) A. J. Chandwadkar—National Chemical Laboratory, Pune.

634/DEL/85: Improvements in or relating to the preparation of 3-acyloxy and 3-aroxyloxy-isoxazole derivatives, R.B. Mitra, A. Subba Rao, G.D. Ray, S.M. Toke and S.G. Patil—National Chemical Laboratory, Pune. □

फार्म 4/FORM IV

[नियम 8 देखिए/(See Rule 8)]

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I, S.P. Ambasta hereby declare that the particulars given above are true to the best of my knowledge and belief.

ता०/ Dated 15 March 1986

Sd/- S.P. Ambasta

प्रकाशक के हस्ताक्षर/ Signature of Publisher



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

VOL 36, NO 6 30 MARCH 1986

Smoke-free efficient domestic ovens and a quick solid ignitor

The Central Fuel Research Institute (CFRI), Dhanbad, has developed and patented two designs of double chamber oven, capable of burning cheap and easily available coal in clean and efficient manner. These designs enable raw coal (1.8 kg) to be devolatilized in an outer chamber. The devolatilized coal burns practically in a smokeless and efficient manner in the inner chamber. The coal volatiles released from the

outer chamber can either be burnt separately in a gas stove or injected into the central coke fired chamber through suitable pipe connections to provide additional heat.

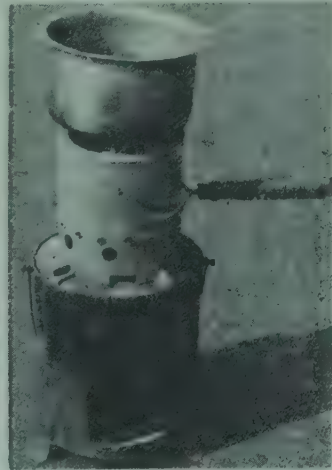
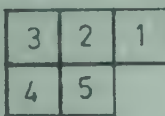
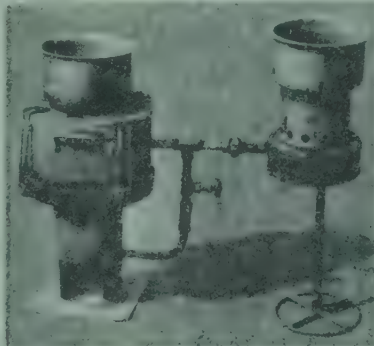
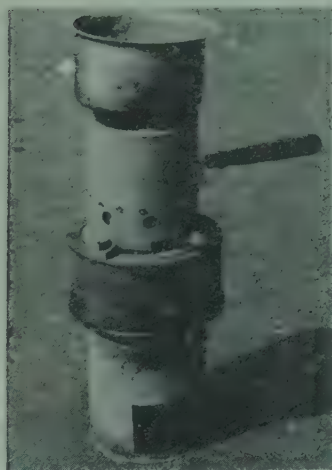
In order to facilitate quick ignition of the solid fuels, and to get rid of the undesirable smoke from conventional ignitors like cow-dung cake, kerosene oil, wood and agro-wastes CFRI has developed a solid ignitor with saw-dust as the main ingredient for initial lighting up of fuel in domestic ovens. With this ignitor, cooking can be started more quickly than that possible with con-

ventional ignitors. The cost of two pieces of the ignitor, weighing about 90g and sufficient to light up one charge, is only 50 paise approximately.

A suitable attachment, called the v.m. burner, developed at CFRI (patent applied for) can be utilized in conjunction with conventional domestic ovens for smokeless combustion of raw coal. The efficiency of the ordinary oven using the ignitor and the v.m. burner attachment is about 30% when semi-coke from low temperature carbonization of coal is used as the fuel. The thermal efficiency of this oven without the attachment and ignitor is about 27%.

The design of a portable domestic oven has been improved by making provisions for supplying pre-heated air into the fuel bed through perforations on side walls, ensuring thereby quicker, more efficient and clean combustion of solid fuels, particularly those containing high ash. This oven when used in conjunction with v.m. burner and CFRI developed ignitor can also permit attainment of 26-28% thermal efficiency with raw coal as fuel.

Interested entrepreneurs may contact the Director, CFRI, Dhanbad, for terms of commercialization of the processes



Smoke-free, efficient domestic ovens developed by CFRI:

- 1 Double chamber stove coupled to gas stove
- 2 Double chamber oven with gas circulation system
- 3 Improved portable oven with V M burner
- 4 Improved portable oven
- 5 Conventional portable oven with V M burner

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- | | |
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| Coil expanding and spreading
machine
—NRDC award-winning invention | ... 44 |

relating to (i) double-chamber ovens, (ii) v.m. burner attachment, (iii) smokeless solid ignitor, and (iv) improved portable domestic oven. □

Aluminium Syntan (Alutan)

The Central Leather Research Institute (CLRI), Madras, has developed know-how for aluminium based retanning material. Aluminium is bound irreversibly to syntan component which helps in preparation of soft, full and intensely dyed leathers as well as white crust. Alutan is particularly useful for application in suedes. □

Automatic spoken word recognition system

The Central Electronics Engineering Research Institute's extension centre at New Delhi has developed an automatic spoken word recognition system which works using the technique of acoustic pattern matching. The spoken words are first converted into electrical signals by means of a microphone. A bank of filters analyzes these electrical signals. Their averaged outputs are converted into digital signals and then stored in an RAM. These are quickly compared with similar data for known words, analyzed and recorded earlier on a semipermanent memory such as an EPROM. It is important to have these reference patterns for comparisons to be made. These comparisons are performed rapidly with the help of a microprocessor and the recognized utterance is displayed visually. An appropriate output signal is also available to actuate other control circuits for different applications. An advanced technique of linear time warping is made use of to take care of the differences in the duration of utterances as spoken by an individual. The system is speaker dependent at the moment but can be easily trained for a new speaker. Presently the system works with ten spoken digits (zero to nine) but has a built in capability to operate with 50 isolated spoken words.

This is the first step towards evolving a man-machine communication system using voice signals. R&D work related to sophisticated voice input-output system is being pursued actively in the laboratory. An immediate goal is to increase the capability of the above system by increasing its vocabulary and, if possible, by making it independent of the speaker. Attempts are also being made to recognize the speaker.

Such systems have numerous applications in civilian and military tasks. To mention a few the isolated word recognition systems can be used for controlling robots, operating machines with voice commands in factories, data entry situations where use of keyboard is not convenient, as an aid to blind people, in voice-operated telephone dialling, information retrieval systems and office automation. □

Energy conservation in cement manufacture

In its efforts towards conservation of energy, the Central Building Research Institute (CBRI), Roorkee, has established that the cement clinkerization can be achieved at 1250°C as against 1400°C, the normally used temperature. A cement raw mix has been finalized for this purpose. The cement clinkers obtained at 1250°C are softer and consume much less energy to grind as compared to the normally available cement clinkers. The lowering in temperature of clinkerization by about 150°C results in a saving of about 15% energy used in clinkerization, which in turn can be used to increase the production of cement. The cement obtained from these clinkers bears very low quantity of free lime and the results of tests on long term curing in water show that the cement is sound and gains strength even after 28 days. The cement so obtained conforms to IS 269-1976. □

Workshop on Patent Procedures & Related Matters

The CSIR Technology Utilisation Division's Patents Unit organized a

two-day workshop on Patent Procedures & Related Matters, during 20-21 December 1985 at the National Physical Laboratory, New Delhi. About 40 participants from different constituent laboratories of CSIR attended the workshop which covered various aspects of patent system, viz. patent procedure, patentable inventions, preparation of the write-up for drafting specifications, opposition proceedings, patent information, etc. The workshop would help facilitate close interaction between the information and liaison wings of the CSIR laboratories and the Patents Unit for obtaining expeditious grant of legally valid patents. □

Shri Shivraj V. Patil visits RRL-Jammu

Shri Shivraj V. Patil, Minister of State for Science & Technology and Vice President, CSIR, visited the Regional Research Laboratory, Jammu, on 1 February 1986. He went round the different sections of the laboratory and held discussions with the scientists of the laboratory. In his address to the RRL-Jammu staff, the CSIR Vice President discussed the factors: autonomy and accountability. He called upon the scientists to take up mission-oriented projects which are in conformity with the plans already formulated for the country as a whole, and CSIR in particular. In the areas where latest technologies can be purchased not much effort is needed. There should be greater concentration of effort in areas where technology cannot be purchased easily. Shri Patil reminded the scientists that all of them could get better remuneration outside the country and they were here for the feeling for the country and not money, and that spirit should guide them in their work. □

CBRI participates in NRDC Exhibition on Rural Development

The Central Building Research Institute, Roorkee, participated in the

Exhibition on Rural Development, organized by the National Research Development Corporation of India at Durg from 15 to 31 January 1986 and displayed several charts models and samples on low cost housing techniques and low cost latrines and wastewater disposal systems. Thousands of visitors including Shri Moti Lal Vohra, Chief Minister of M.P., and Shri Shivraj V. Patil, Shri Chandu Lal Chandrakar, Shri Vasant Sathe, visited the CBRI stall. □

Rotating biological rope contactor

NEERI's process awarded

A new waste water treatment process, rotating biological rope contactor, developed by Dr A.S. Bal and his colleagues in the Technology Demonstration Division of the National Environmental Engineering Research Institute, Nagpur, has won the Best Invention Award at the 46th All-India Industrial Exhibition 1986, organized at Hyderabad. The award carrying a gold medal, Rs 1000 and a certificate of merit, was given away by Shri K. Bhaskaran, Chief Justice of the Andhra Pradesh High Court, on 17 February 1986.

The rotating biological rope contactor is a new step in wastewater treatment technology. This differs from the hitherto known process of aerobic treatment of wastewater in that it is more efficient for the reduction of organic contents. Other plus points of this technique are: low cost treatment, and low power consumption requiring little maintenance. It is fully indigenous requiring much less area. The unit has been tested extensively and has yielded very good results. □

Lead tetraacetate—applications in synthetic organic chemistry and transformation of carbohydrates and their analogues

Shri D.G. Talekar, while working at the National Chemical Laboratory, Pune,

studied the applications of lead tetraacetate in synthetic organic chemistry and in the transformation of carbohydrates and their analogues. The researcher developed a new route for the conversion of alkyl halides to aldehydes having two extra carbon atoms. This route involves: condensation of alkyl halide (primary or secondary) with the enolate derived from methyl 3-oxo-4-phenylbutanoate, saponification of the condensation product to benzyl ketones, reduction of the benzyl-ketones to homobenzylic alcohols, and fragmentation of the homobenzylic alcohols with lead tetraacetate and iodine.

2-Hydroxyindanes and 2-hydroxy-tetralins being homobenzylic alcohols underwent facile fragmentation on heating with lead tetraacetate-iodine to furnish aldehydes. The resulting aldehydes were found to be useful intermediates for the synthesis of 3,4-dihydro-1H-2-benzopyrans and 1,3,4,5-tetrahydro-2-benzoxepins. Dihydrobenzopyrans occur widely in nature and some of them exhibit biological activities.

γ - and δ -lactones on reaction with benzylmagnesium chloride do not furnish benzylketones in satisfactory yields. The corresponding γ - and δ -acetoxy benzylketones were prepared conveniently utilizing the facile fragmentation of homobenzylic alcohols on treatment with lead tetraacetate iodine. For example, 4,7-dimethyl-3,4-dihydrocoumarin was reacted with excess benzyl magnesium chloride to furnish 1,1-dibenzyl-1-3-(2'-hydroxy-4'-methylphenyl)butan-1-ol. Acetylation of this Grignard product and subsequent fragmentation gave the benzylketone, 1-phenyl-4-(2'-acetoxy-4'-methylphenyl)pentane-2-one.

Synthesis of deoxysugars involving nitriles as key intermediates has been done at NCL. As a part of this programme, the transformation of a number of halides, containing other functional groups such as ester, to nitriles on reaction with NaCN was critically studied. It was shown that

haloesters which have acetoxy and halogen groups located on adjacent carbon atoms do not furnish nitriles in satisfactory yields.

Shri Talekar worked under the supervision of Dr A.S. Rao and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

Synthesis of quinones, polycyclic compounds, and transformation of carbohydrates

Shri P.L. Joshi of the National Chemical Laboratory, Pune, carried out the synthesis of quinones, polycyclic compounds, and transformation of carbohydrates.

Acetylation of 1,4-dimethoxy-2-methyl naphthalene with acetic anhydride in the presence of aluminium chloride in carbon disulphide furnished 6-acetyl-1,4-dimethoxy-2-methylnaphthalene, a potential intermediate for the synthesis of anthracyclines. Two new naphthoquinones, viz. 6-ethyl-2-methyl-1,4-naphthoquinone and 7-ethyl-2-methyl-1,4-naphthoquinone were synthesized and their NMR spectra examined.

A new reagent, 2-acetoxy benzoyl bromide was prepared by reacting 2-acetoxybenzaldehyde with N-bromosuccinimide. This reagent is very useful in transforming terminal 1,2-diols to the corresponding oxiranes. One of the oxiranes thus prepared was optically pure propylene oxide. This investigation is of great significance since several terminal oxiranes are known to be useful intermediates for the synthesis of biologically important compounds such as oxprenolol, racemic feiolide and serricornin.

A new nucleoside, 7-(6'-bromo-6-deoxy-B-D-glucopyranosyl) theophylline was prepared. Theophylline was condensed with glucose pentaacetate and the resulting product was deacetylated. 4'- and 6'-hydroxyl groups of the condensation product were blocked

and the remaining hydroxyls were acetylated. Reaction with N-bromo-succinimide and subsequent deacylation furnished the new nucleoside.

The reduction of a number of nitriles to aldehydes with sodium hypophosphite and raney nickel and the blocking of the resulting aldehydes as imidazolidine derivatives by reaction with 1,2-dianilinoethane was examined. This

type of transformation was used to prepare 2,4-O-benzylidene-1-deoxy-1-(1,3-diphenyl-2-imidazolidyl)erythritol, an intermediate for the synthesis of 2-deoxyerythropentose from the corresponding nitrile.

Shri Joshi worked under the guidance of Dr A.S. Rao and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

SYNTHESIS, CHARACTERIZATION AND CATALYTIC PROPERTIES OF ZEOLITES

Bhatnagar Prize-winner Dr Ratnasamy's Work

Since his joining the National Chemical Laboratory (NCL), Pune, in 1979, Dr Ratnasamy has been actively engaged in the synthesis, characterization and evaluation of catalytic properties of zeolites, and has contributed significantly to the development of zeolite catalysts with industrial applications. These include the discovery and



synthesis of new catalysts like iron and lanthanum silicates which have opened new vistas in the structural and catalytic chemistry of zeolites. These new zeolites (designated as 'ENCILITES' for NCL zeolites) have proved superior to the conventional aluminium zeolites for many industrial applications like xylene isomerization, naphtha reforming, toluene disproportionation and hydrodewaxing. These zeolites are already manufactured commercially by two

parties in India and licenced to one firm in UK. This is the first catalyst and so far the only catalyst developed in India to be manufactured abroad. Today, as a result of the dedicated efforts of Dr Ratnasamy, NCL has become one of the top five organizations in the world engaged in both basic and applied research in zeolite catalysts.

The work on the development of xylene isomerization catalyst carried out at NCL has culminated in the Indian Chemical Manufacturers Association (ICMA) conferring the 'ICMA award for forward technology development of 1985' on the Indian Petrochemicals Corporation Limited (IPCL), Vadodara. In recognition of the remarkable success in inventing the catalyst ENCILITE-1 and for the fruitful interaction with the Associated Cement Companies (ACC) Limited, Bombay, for its manufacture, and in effectively transferring the technology to IPCL, a special citation will be given to NCL. The catalyst, developed at NCL, is being commercially manufactured by ACC for IPCL.

Dr Ratnasamy has had a brilliant academic career. He obtained his Ph.D. from the University of Madras in 1967 for his research in heterogeneous catalysis. Proceeding to USA, he worked as research associate at the Clarkson College of Technology, New York, where his field of interest was acid-base catalysis. Later, he was at the

Laboratoire de Physicochimie Minérale, Louvain, Belgium, where he made a structural study of hydrocracking, reforming and hydrodesulphurization catalysts. In 1972 he joined the Indian Institute of Petroleum, Dehra Dun, where he was a project coordinator for the work on naphtha reforming and hydrodesulphurization.

Dr Ratnasamy is recipient of many honours and awards. He was Senior Fellow, Alexander Von Humboldt Foundation, FRG (1976-77); Secretary, Catalysis Society of India (1980-82); Coordinator, Indo-Soviet Cooperation Programme in Catalysis (1984) and UNDP Consultant and Course Director for UNDP/UNESCO sponsored 'International Course on Heterogeneous Catalysis', Chile (Sep. 1985). Recently he was awarded the VASVIK Industrial Research Award for Chemical Sciences for the year 1982.

Dr Ratnasamy's contributions in the field of zeolite catalysis have resulted in over 70 publications in international journals which have won him wide acclaim both nationally and internationally. A number of international journals in the area of catalysis refer the articles to him before publication. Dr Ratnasamy has 21 Indian patents to his credit. Several foreign patent applications corresponding to Indian patents on synthetic zeolites and other novel catalysts have been filed in a number of selected countries. Dr Ratnasamy is a recognized guide of the University of Poona for Ph.D. work. □

Coil expanding and spreading machine

NRDC award-winning invention

Efficient performance of an electrical machine depends on the configurational accuracy of stator coil. With the existing technological status, forming of correct and identically shaped coils poses problems to all the electrical machinery manufacturing industries. So far the

Dr P. Ratnasamy, National Chemical Laboratory, Pune, has been awarded the 1984 Shanti Swarup Bhatnagar Prize in engineering sciences (along with Dr D.D. Bhawalkar of the Bhabha Atomic Research Centre, Bombay) [CSIR News, 36 (1986), 29].

expanding and spreading operations of these coils have been done manually in different stages. It is needless to mention that the method is too laborious to follow. Even the most sophisticated imported machines available in the country straight-expands the straight coil side only leaving other operations to be achieved manually and by malleting.

To avoid a series of such crude and age-old method, the Central Mechanical Engineering Research Institute (CMERI), Durgapur, has successfully innovated a hydraulically operated coil expanding and spreading machine meant for forming the closed loop stator coil automatically in single operation that ensures exact and identical coil and simplifies the manufacturing process leading to increase in productivity with quality effectiveness.

The major components of the developed machine include central spreading arm, column, coil shaping attachment and bed. All the major and frequently repetitive motions are actuated hydraulically through an interlocking device. Only change-over from one coil size to another is manual.

The salient features of the machine are: all forming operations are done automatically in single setting; the forming operation for a big coil takes 8-10 min. including manual loading and unloading which is one-fortieth of the time taken by the prevalent method; identical shape of different coils ensures easy fitting in machine slot and efficient operation; cost of the machine is appreciably lower than that of the imported less efficient ones; and coil production cost has been sliced down tremendously.

The machine installed at the premises of the Jyoti Ltd, Baroda, is in production line and is giving outstanding performance.

Brief profiles of the inventors:

Prof. S.K. Basu

Prof. Basu obtained his B.E. degree in Mechanical Engineering from the University of Calcutta in 1951. After four years' training in industries both at home and abroad, he joined the Indian Institute of Technology (IIT), Kharagpur, as a lecturer in Engineering Production. In 1959, he visited USSR on

a UNESCO fellowship. On his return from Moscow with Ph.D. degree in machine tools, Prof. Basu worked in the IIT as an Assistant Professor of mechanical engineering till 1965 when he joined the Regional Engineering College, Durgapur, as a Professor and Head of the Department of Mechanical Engineering.

He worked in Mechanical Engineering Research & Development Organization, Pune, as its Deputy Director-in-charge for a period of six years, and has been Director of CMERI since 1976.

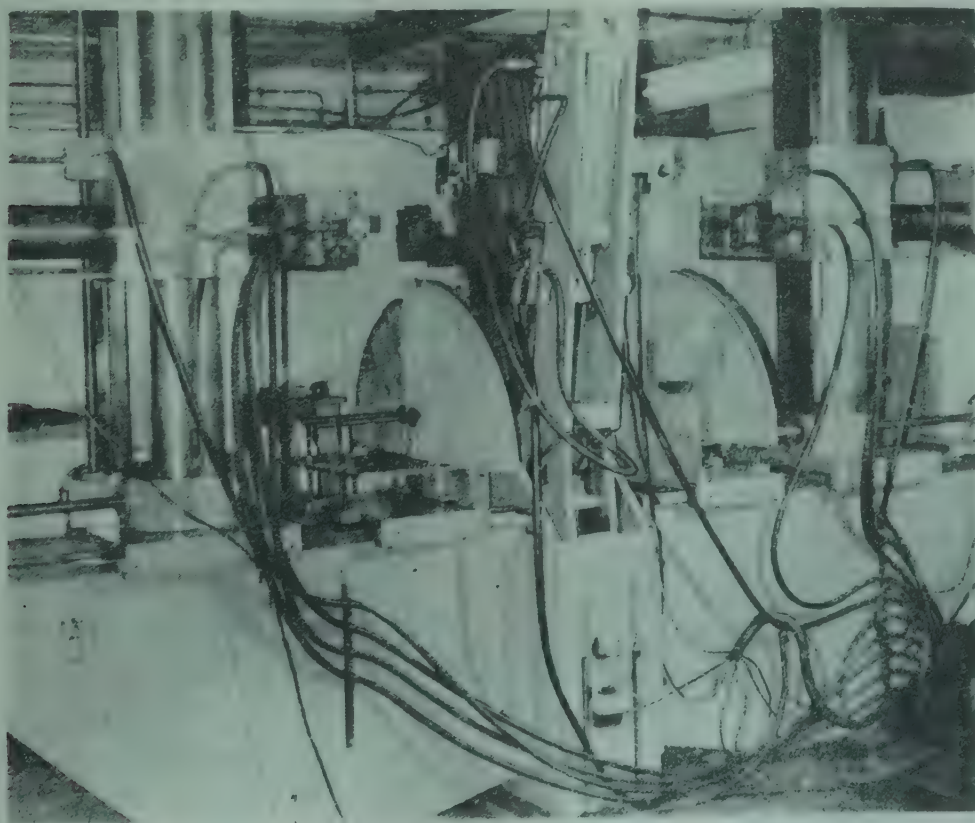
Prof. Basu is a recipient of four awards from the Institution of Engineers (India), viz. Institution of Engineers' Prize, Chandra Prakash



Memorial Prize (twice) and Sir R.N. Mookerjee Memorial Gold Medal. He also won the Republic Day Invention Promotion Board Award for development of rotillor in 1976 and the Independence Day Invention Promotion Board Award for the invention of magnetic particle clutch in 1977. He also received the Xth & XIth AIMTDR Awards for best research oriented papers in 1982 and 1984.

He has about 100 research papers to his credit on machine tools and tribology, and 8 scholars have completed their Ph.D. under his guidance. He has eight patents to his credit.

Prof. Basu is author of five engineering text books: (i) *Design of Machine Tools*; (ii) *Elements of Mechanical Engineering*; (iii) *Works Organisation and Management*; (iv) *Fundamentals of Tool Engineering Design* and (v) *Design of Recirculating Ball Screw Assemblies* (in monograph form).



Coil expanding and spreading machine developed by CMERI

He is a fellow of the Institution of Engineers (India), and of the Institution of Mechanical Engineers (London), member of Operational Research Society of India and Vice-President of Indian Association for Productivity Quality & Reliability.

Dr R.C. Bishnu

Dr Bishnu graduated in Mechanical Engineering from the Jadavpur University in 1964 and obtained his Master of Engineering (Mechanical) degree from the Calcutta University in 1967. Before joining CMERI in 1968 as senior research fellow, he served as technical teacher trainee for a year in the B.E. College, Howrah. At present he is holding the post of Scientist EI.



Dr Bishnu has mainly worked in the field of stress analysis and design & development of special purpose machines. He obtained his Ph.D. degree from the Jadavpur University, in 1976, for his thesis entitled 'Thermal stress analysis of ingot with photo-thermo-elasticity'. He also worked on analysis of strength and power of Orthodox Tea Rolling Machine and suggested design modification for improvement.

He has two patents and six research papers to his credit. One scholar has submitted Ph.D. thesis under his guidance. He has been associated with the design and development of the following machines: manipulator for submerged arc welding, semi-automatic electrochemical marking machine, road safety device, coil expanding and spreading machine, cloth-meter, special purpose hydraulic jack, lens centering

and edge grinding machine, and electrochemical deburring machine.

Shri M.K. Banerjee

Shri Banerjee, after obtaining diploma in Mechanical Engineering of the State Council, West Bengal, in 1963 did his graduation in Mechanical Engineering from the Jadavpur University in 1968.



He joined the Birla Industrial & Technological Museum, Calcutta, as a Foreman in 1965 and subsequently rose to the post of Mechanical Engineer. In 1971 he joined the Indian Institute of Chemical Biology, Calcutta, as Scientist B. After serving for six years at IICB, he joined, on transfer, the R&D Section of CMERI and is at present Scientist C1 in CMERI.

Shri Banerjee has been associated with design and development of the following machines: road safety device, hydraulically operated coil expanding and spreading machine, attachment of spring coiling machine, and lens centering and edge grinding machine.

He has two patents to his credit and is a member of the Undergraduate Board of Studies, University of Burdwan.

Shri B. Sarkar

Shri B. Sarkar completed Draftsman-ship (Mechanical) course from ITI, Coochbehar, in 1962 and passed the University Entrance Examination in 1975 from the Burdwan University. He served in the Titaghur Paper Mill for one year before joining CMERI in 1964 as Draftsman. He is at present attached to the Machine Tools Section of CMERI as Scientist A1.

Shri Sarkar has been associated with the design and development of ten head paper insulating machine, fine wire drawing machine, fin tube forming



machine, electrochemical marking machine, lens centering and edge grinding machine, high speed spindle and coil expanding and spreading machine. He has one patent to his credit. □

DEPUTATION BRIEFS

Dr C.K. Kale and Shri R.V. Bhoyar

Dr C.K. Kale and Shri R.V. Bhoyar of the National Environmental Engineering Research Institute, Nagpur, underwent an advanced training in 'Industrial water pollution and environmental control' at the Water Quality Institute, Horsholm, Denmark, during 5 August-25 October 1985. They were on an Indo-Danida Fellowship under a bilateral programme, sponsored by the Danish International Development Authority. The training programme covered biological investigations, monitoring of receiving waters, water analysis, data processing, administration of environmental protection legislation, etc. □

CONFERENCE BRIEFS

International Workshop on Sanitary Considerations of Land Application of Waste

Shri S.K. Titus of the Solid Waste Division, National Environmental Engineering Research Institute (NEERI), Nagpur, participated in the title workshop held at Kiew, USSR, during 2-13 December 1985.

The workshop was organized by the Centre of International Projects of the USSR State Committee for Science & Technology and UNEP. It was attended by 10 participants who were from developing countries including India, China, Argentina, Peru, Togo, Spain and Portugal.

The workshop covered theoretical aspects like potential benefits of land application of waste and health risks associated with waste disposal. The practical studies covered methods for chemical analysis of soil contaminated by organochlorides, organophosphoric pesticides, lead, arsenic and mercury. Discussions were held on the analytical techniques used to assess the stability of organic urban waste when subjected to aerobic treatment method.

* * *

Seminar on Treatment and Use of Sewage Effluent for Irrigation

Dr G.B. Shende, of the Waste Water Agriculture Division, National Environmental Engineering Research Institute (NEERI), Nagpur, participated in the title seminar held at Nicosia, Cyprus, during 7-9 October 1985. He presented a paper entitled 'Status of wastewater treatment and agricultural reuse in Asia' which covered different aspects of waste-water treatment, land application and agricultural reuse systems, soil effects and public health and environmental implications.

The seminar was attended by about 80 delegates including 52 from 15 countries of the near East-region and 15 invitees from other countries including Germany, India, USA, France, UK, Japan, Mexico and Portugal. The seminar emphasized that although the general broad-based guidelines for agricultural reuse of wastewaters were available, there was a need for development of location-specific guidelines through intensification of R&D for optimum utilization of the non-conventional water resource in the form of wastewater keeping in view the safety of environment. □

TRAINING COURSES

Short Course and Workshop on Heat Pumps and Energy Conservation

A joint research programme has been operating between the National Chemical Laboratory, Pune and the University of Salford, UK, on 'Heat energy recycling and heat pumps'. The object of this programme is to promote the use of heat pumps in Indian industries. As a part of this joint programme, short courses and workshops are organized annually to give the participants a realistic appreciation of the availability and potential of heat pump technology with a special reference to Indian conditions. The present two-day short course and workshop, held on 2-3 December 1985 at NCL, was jointly organized by NCL and the University of Salford. The course was attended by about forty-five participants from a variety of industrial organizations. The industries represented included refinery, petrochemical, fertilizer, chemical and sugar. Some compressor manufacturers, equipment fabricators and suppliers, project engineering companies and energy consultants also attended the course.

Dr L.K. Doraiswamy, Director, NCL, while welcoming the delegates, emphasized the need for energy conservation, and gave an overview of the potential for heat pumps in Indian industries in the context of India's energy requirements and resources. Mr J. Brasnett, the British Deputy High Commissioner, Bombay, delivered the inaugural address. Prof. F.A. Holland, Chairman of the Department of Chemical and Gas Engineering, University of Salford gave a brief outline of the Salford/NCL link. A course of lectures was given by Prof. F.A. Holland, Dr S. Devotta, Dr V.S. Patwardhan and other members of NCL heat pump group. The lectures covered fundamentals, components and types, design and techno-economic evaluation and potential and proven industrial applications of heat pumps. The participants were also given

working demonstration of the heat pump units installed in NCL. The final session was a panel discussion chaired by Prof. F.A. Holland.

A similar course is scheduled to be held at NCL during 17-18 November 1986.

* * *

Improved Methods and Precasting

The Central Building Research Institute, Roorkee, in collaboration with the National Buildings Organisation and the Centre for Improving Construction Skills, organized a one-week training course for masons on 'Improved Methods and Precasting'. The course was inaugurated by Giani Zail Singh, President of India, on 18 January 1986 in New Delhi. An exhibition depicting the improved methods of construction for brick laying with new gadgets like endframe and string holder, improved methods of plastering using triangular trowel, corner finishing gadgets and two deck scaffold, improvised form work using MS clamps for slab and beam shuttering and prefabricated schemes such as stone masonry blocks for walling, RC plank, channel unit, RB panel and precast brick arch for roofing was also arranged. Nineteen masons from CPWD, DDA Builders Association and other construction agencies attended the training course. These masons were provided with on-the-job training and practice on the use of gadgets for brick laying and plastering. Also, they were explained the dos and don'ts for precasting building components through demonstration of precasting of the components.

At the valedictory function, Shri Dalbir Singh, Minister of State for Urban Development, distributed the certificates to the masons who attended the course.

* * *

Environmental Awareness

The National Environmental Engineering Research Institute (NEERI), Nagpur, organized a ten-day course on

Environmental Awareness during 16-17 December 1985, under the sponsorship of the Indian Petrochemicals Ltd (IPCL), Vadodara. Sixteen trainees who participated were staff of IPCL, involved in the operation of pollution control units. The course was divided into three parts: Water pollution, Air pollution and Solid waste management. A notable feature of this course was that all lectures were delivered in Hindi. The trainees also carried out practicals. □

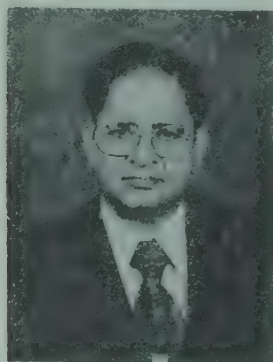
PERSONNEL NEWS

Appointments/Promotions

Dr B.S. Mathur

Dr B.S. Mathur, Scientist EII of the National Physical Laboratory, New Delhi, has been promoted on assessment, as Scientist F (30 Oct. 1984). Dr Mathur joined NPL on 27 August 1973 as Scientist EI and was merit promoted to Scientist EII on 30 October 1980.

Dr Mathur did his doctoral work at the Harvard University, USA, on MASERS and post-doctoral work at the Columbia University, USA, on



optically pumped atomic systems. He was on the faculty of Indian Institute of Technology, Kanpur, from 1968 to 1973. At NPL, he is heading the Time and Frequency Section which has been involved in the maintenance, development and updating of time standards which include the high frequency standard time broadcast, time dissemination via satellites and fabrication of indigenous time standards.

Dr Mathur is a Fellow of the Institution of Electronics and Telecommunications Engineers; Fellow of the

Metrological Society of India; Senior Member, Institute of Electrical and Electronics Engineers, USA, Chairman, National Working Group-7 of International Radio Consultative Committee; Member, Commission 31 of International Astronomical Union and Member, Indian National Committee of International Union of Radio Science.

He was the Convener of Seminar on Time and Frequency, 1976; Study Group Meeting on Time and Frequency, 1978, and International Symposium on Time and Frequency, 1981. He was the Convener, Local Organizing Committee of the XIX General Assembly of the International Astronomical Union held in New Delhi on November 1985.

Dr Mathur has published more than 60 papers and has edited two proceedings and has been the Guest Editor of two special issues on Time and Frequency of the *Journal of the Institution of Electronics and Telecommunications Engineers*.

Honours & Awards

Dr S.C. Pakrashi

Dr S.C. Pakrashi, Director, Indian Institute of Chemical Biology, Calcutta, has been elected Treasurer of the Indian Science Congress Association for a period of three years from 1986-87.

Dr I.N. Sengupta

Dr I.N. Sengupta of the Indian Institute of Chemical Biology, Calcutta, acted as the chairperson of five technical sessions on 'Bibliometrics', at the 15th All India Conference of the Indian Association of Special Libraries and Information Centres (IASLIC) held on 26-29 December 1985 in Bangalore.

Dr D.K. Ganguly

Dr D.K. Ganguly, Scientist EII, Indian Institute of Chemical Biology, Calcutta, has been elected Founder-Fellow of the Indian Academy of Neurosciences in the inaugural ceremony of the annual meeting of the academy held on 21 February 1986 at Aligarh.

Retirements

Dr V. Damodaran, Dr A.S. Gupta (both Scientists EII) and Dr C.G. Joshi, Scientist EI of the National Chemical Laboratory, Pune, retired on superannuation, on 31 October 1985. □

PATENTS ACCEPTED

Indian Pat. 156459: Process for the coating of solar cells with anti-reflection film, A. Prasad, S. Balakrishnan, S.K. Jain, S.N. Singh, N.K. Arora & G.C. Jain—National Physical Laboratory, New Delhi.

Indian Pat. 156460: Production of stabilized coal oil slurry, R.N. Paul, B.K. Mall & M. Chakraborty—Central Fuel Research Institute, Dhanbad.

Indian Pat. 156462: Diffusion boat for simultaneous diffusion of P and N dopants into silicon wafers, S.N. Singh, N.K. Arora, A. Prasad, G.C. Jain & V.K. Sharda—National Physical Laboratory, New Delhi.

Indian Pat. 156463: Electrolytic chromium deposition on nickel plated metal substrates, H.V. Udupa, S.R. Natarajan, S. Sriveeraghavan & R. Krishnan—Central Electrochemical Research Institute, Karaikudi.

Indian Pat. 156535: Logic control device for generation pulse width-modulated pattern adopted for a smooth switch, G.N. Acharya, U.M. Rao, S.S. Shekhawat and R. Verma—Central Electronics Engineering Research Institute, Pilani.

Indian Pat. 156778: Synthesis of 2,2-dicarbalcoxymino-5, 5-dibenzimidazolyl derivatives—Central Drug Research Institute, Lucknow.

Indian Pat. 156876: A protection device for civil structures and electrical equipment—Central Building Research Institute, Roorkee.

Indian Pat. 156886: Medicinal pellets for use as subdermal implants for controlled release of a drug for an extended period of time in a human or animal system—Central Drug Research Institute, Lucknow. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Workshop on Operating Experience with FCC Units and Strategies for Optimization

Against a scenario of increasing demand for middle distillates, i.e. kerosene and diesel, the petroleum refining industry in India has undergone a significant increase in conversion facilities to upgrade value of the product state; particularly with respect to the production of diesel. Four new fluidized catalytic cracking (FCC) units were commissioned in 1985, bringing the FCC intake capacity to a total of about 6.5 million tonnes per annum. A special feature of the FCC operations in India, as opposed to the rest of such operations in the western world, is the desire to maximize diesel production instead of gasoline. Also, the nature of indigenous feedstocks, such as that derived from Bombay High, is highly waxy. This poses some new technological challenges to the FCC technologist in seeking new approaches to increase diesel yield by optimizing plant operations and by choosing the proper catalyst.

To discuss the existing plant experiences in Indian refineries and to exchange information on ways to improve product yields, the Indian Institute of Petroleum, Dehra Dun, organized a two-day workshop (14-15 March 1986), which had participation of refineries (Indian Oil Corporation, Hindustan Petroleum, Madras Refineries and Bharat Petroleum), catalyst manufacturers [Akzo Chemie (Holland), Crosfield (UK) and United Catalyst

(India)], and R&D scientists (National Chemical Laboratory, IOC R&D Centre and IIP. It was the first workshop of its kind to be held in India devoted ostensibly to the optimization of plant operations.

The workshop began with opening address by Dr R. Krishna, Director, IIP, entitled 'Maximization of middle distillates in fluid catalytic cracking in Indian refineries', wherein he emphasized the need to pay special attention to the choice of the catalyst and to plant optimization. Because the problem is typically Indian, a plea was made for indigenous development of the catalyst. The nation could gain more than Rs 10 crores per annum, Dr Krishna added.

The presentations from the refineries highlighted the experiences in switching over to zeolite catalysts. It was clear from the data presented that there is still large scope for improving the catalyst designs. Two FCC catalyst manufacturers Akzo Chemie (Holland) and Crosfield (UK) also made presentations and Shri G. Balamalliah (IIP) compared the two commercial catalysts with regard to their characteristics, emphasizing the particular requirements for middle distillates maximization.

The workshop requested IIP to undertake the task of analyzing the plant operating data and to prepare a report on the methodology for plant optimization for the refineries. IIP should also come up with recommendations for future course of action by the refineries. All refineries agreed to make the operating data available to IIP on a regular basis, and encouraged IIP for its

efforts towards developing a computer-based software for FCC optimization. □

Workshop on Industrial Metal Finishing

The Rural Science Forum of the Central Electrochemical Research Institute (CECRI), Karaikudi, organized a workshop on Industrial Metal Finishing in Tamil during 1-2 February 1986 at Madurai. This workshop was co-sponsored by the Electroplaters and Metal Finishers' Association of Tamilnadu, the National Institute of Quality Assurance, Madurai District Small Scale Industrialists' Association and Small Industries Service Institute.

The objective of this workshop was to describe the complete science and technology of electroplating and metal finishing in the Tamil language for the benefit of small scale platers and entrepreneurs and to educate them in respect of the recent advances made in this important area and to impress upon them the need for improving the quality of electroplated products. About 150 participants took part in the deliberations of the workshop.

There was a demonstration of instruments and equipment used in plating industry. A special volume

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comprising the lecture notes was brought out in Tamil which included a comprehensive glossary of terms used in plating from Tamil to English and English to Tamil.

A plating clinic in the Tamil language was also arranged as a question-answer session in which a large number of scientists from CECRI provided answers to the problems faced by the plating industries.

Arrangements are being made to hold such workshops in Hindi at Delhi, Moradabad, Ludhiana, Ghaziabad. □

Continuous process for producing jams and jellies

The Central Food Technological Research Institute, Mysore, has developed a continuous process for the production of jams and jellies in higher yields and with better quality. The process is economical in terms of energy consumption and labour cost.

In the process (4 tonnes/day capacity), selection of fruits, peeling, cutting and pulping are done by the standard method. The pulp is mixed with other normal ingredients and then homogenized and fed into an evaporator. The product is withdrawn continuously and filled in suitable containers. Adoption of the continuous process by the industry would help boost production of jams and jellies which have an expanding market, both in the country and abroad. □

Potato flour and chips

The Central Food Technological Research Institute's Lucknow Regional Centre has standardized a cottage scale process for producing potato flour using indigenous equipment. The operations consist of peeling, cutting in halves or even small pieces, pre-treatment, soaking, granulation, processing and drying, grinding and packaging.

The flour obtained by this process could be reconstituted easily with

boiling water to get mashed potato which can be used for making a wide variety of products like *tikkia*, *sewain*, stuffed *paratha*, *papad*, *pakoda* and *kofta*.

Potato chips

The Lucknow Centre has also developed a simple method to prepare flat dehydrated potato chips that can be packed compactly like biscuits. Potato chips, prepared by existing methods, lose their flatness and become curled during dehydration.

The CFTRI process consists of peeling, slicing, dicing, blanching, preliminary drying, fixing, and final drying. The ends or roughage obtained during dicing can be separately dried and used as adjunct in snack foods.

Further details regarding the processes can be had from the Head, CFTRI Regional Centre, Lucknow. □

CFTRI project reports on ready-to-eat foods and modern dal mills

The Orissa Government plans to introduce low-cost ready-to-eat nutritious foods to combat malnutrition among children in the state. In this context the Central Food Technological Research Institute, Mysore, has submitted a project report to the state government giving details about nutritious mixes, raw materials needed and locations for setting up manufacturing plants, in addition to details regarding technology, plant, organization, etc.

Use of locally available commodities like *jowar*, cowpea, soybean and jaggery is suggested for preparation of these nutritious mixes. It is also possible to use alternative millets/pulses in the formulation.

The institute has also prepared a project report on setting up of modern dal mills for the Orissa State Co-operative Marketing Federation Ltd. The project report covers details regarding raw material, location and infrastructure, different aspects of technology, plant and organization.

Pulses (grain legumes) grown in Orissa State include *arhar*, *moong*, greengram, blackgram and *kulthi* (horsegram). These are mostly processed into *dal* by traditional methods which are time-consuming, laborious and completely dependent on climatic conditions. By using modern *dal* mills which could be operated under all weather conditions, the overall yield of *dal* can be increased while cutting down processing time. □

Studies on the cell surface of *Vibrio cholerae*

Vibrio cholerae colonizes in the small intestine presumably by the interaction of specific bacterial cell surface components as well as non-specific hydrophobic interactions with the intestinal mucosa. Excretion of cholera toxin from its cellular location has been shown to be unique to *V. cholerae*, since cholera toxin synthesized in genetically engineered *E. coli* cells is not excreted and accumulated in the periplasmic space as heat-labile enterotoxin (LT) of *E. coli*. In contrast, when the *E. coli* LT is synthesized in *V. cholerae* cells containing a plasmid with the LT toxin gene, the product is exported out. It has been postulated that this behaviour of *V. cholerae* cells may be due to an unusual organization of its envelope components. Studies with mutants have suggested that changes in the cell surface may also play a role in the virulence of *V. cholerae*. In this context, Smt. Anuradha Lohia of the Indian Institute of Chemical Biology, Calcutta, undertook studies on the cell surface of *V. cholerae* with a view to examining whether the problem of excretion of the product of the cloned toxin gene is inherent in the product itself or the cell surface composition is responsible for the excretion of cholera toxin. Such studies might have consequence in the development of an oral vaccine for the disease cholera.

The researcher demonstrated that the rate and extent of lysis of *V. cholerae*

cells under non-growing conditions are dependent on the osmolarity of the growth medium. Gross alterations in cellular morphology are observed when these cells are grown in media of high and low osmolarity. Rate of lysis of cells under non-growing conditions increases after treatment with chloramphenicol. Spheroplast like bodies are formed in medium of high osmolarity, but not in low osmolarity. This effect of chloramphenicol on *V. cholerae* cells is unique to these organisms. Changes in the osmolarity of the growth medium also regulate the expression of outer membrane proteins. This regulation is abolished if *V. cholerae* cells are grown in phosphate depleted medium. Using osmotically fragile mutant of *V. cholerae* cells, it was shown that the lytic behaviour and the composition of outer membrane proteins are identical with that of the wild type cells. The mutant cells also revealed a similar dependence on the osmolarity of the growth medium. This response to osmotic stress of *V. cholerae* cells is atypical and resembles that of halobacteria or other gram negative bacteria whose peptidoglycan has been damaged by either lysozyme or antibiotics. This was clearly demonstrated by the extensive lysis of *V. cholerae* cells when suspended in distilled water. The observations made by the researcher suggest that either the internal osmotic pressure of *V. cholerae* cells is significantly lower than that of other gram negative bacteria, or the cells have less stable or weaker outer membranes.

The prediction that *V. cholerae* cells have a weaker cell surface, is partly confirmed from the analysis of the peptidoglycan of these cells. In these studies, the effect of penicillin G (PenG), a specific inhibitor of peptidoglycan biosynthesis, was examined. It was demonstrated that for *V. cholerae* cells there is no difference in sensitivity to ampicillin and PenG. These cells are highly sensitive to PenG and even at the concentration of 0.5 µg/ml, the septum formation is inhibited. At higher

antibiotic concentration (5 g/ml), the elongation process is also inhibited and the cells replicated as spheroplast. It was further shown that the cross-linking of peptidoglycan in *V. cholerae* is at least two-fold less than that in *E. coli*. It was, therefore, predicted that the weaker cross-linking of the peptidoglycan chain might be responsible for the fragility of *V. cholerae* cells relative to other gram negative organisms.

Chaotropes cause complete and immediate lysis of *V. cholerae* cells. This

unique sensitivity of these cells to protein denaturants was utilized in developing the method for the isolation of cell surface. The composition of the outer membrane isolated by this method was found to be comparable with that isolated by the conventional laborious procedures.

Smt. Lohia carried out these studies under the guidance of Dr Jyotirmoy Das of the laboratory and was awarded Ph.D. degree in Biochemistry (1986) by the Calcutta University for her thesis based on these studies. □

EVOLUTION OF THE HIMALAYAS AND THE INDO-BURMESE MOBILE BELT—SCOPE FOR CONCEPTUAL EXPLORATION FOR HYDROCARBON AND OTHER MINERAL RESOURCES

Bhatnagar Prize-winner Dr Acharyya's Work

Dr Acharyya has made significant contribution in stratigraphy dealing with succession and age of the rocks, and their disposition and structure. His major contributions are on the evolution of the Himalayas and the Naga Hills. He has over 60 research publications synthesizing various scientific deductions.

Dr Acharyya has proposed a new continental configuration for the Gondwanaland super-continent. It



includes the Himalaya, the Tibet and parts of South East Asia in its assembly, besides other southern hemisphere continents like South Africa, India,

Dr S.K. Acharyya, Geological Survey of India, Calcutta, has been awarded the 1984 Shanti Swarup Bhatnagar Prize in earth sciences (along with Dr S. Krishnaswami, Physical Research Laboratory, Ahmedabad) [CSIR News, 36 (1986) 29].

Australia, Antarctica and South America. He has deduced break-up history of this super-continent taking into account creation and destruction of the oceans and collision and reamalgamation of some of its continental fragments resulting in creation of the peri-Indian mountain and island arc chain.

Dr Acharyya has worked on various aspects of stratigraphy and structure of the Lesser Eastern Himalayas. Within the poorly fossiliferous rocks of the Eastern Himalayas, his emphasis of research has been on reconstruction of Paleozoic (250-350 m.y. old approx) Gondwanic sediments, which were demonstrated to be deposited in elongated rift-basins associated with ice-rafting, coal bearing sedimentation and rift related volcanism. The Lesser Himalayan exposed older rocks are deduced to be thin-skinned overthrust entities covering potentially hydrocarbon bearing Tertiary (65 m.y. and younger) shelf-geosynclinal sediments, deposition on the Indian foreland.

Marine early Tertiary sediments, regarded as source beds for hydrocarbon in the Indian sub-continent, have been located at several new

locations, which were earlier believed to be barren, precisely by this new geotectonic model.

Dr Acharyya has also worked extensively on the inaccessible Naga Hills ophiolite belt exposed close to Indo-Burmese border. These comprise oceanic sediments (around 50-70 m.y. old), associated volcanics and other magmatic complex and represent highly deformed remnants of the oceanic crust emplaced between the colliding Indian and the Central Burma continental rocks. Trace-element signature from the volcanics and nature of other rocks indicate these to be floor of newly created narrow ocean basin with ocean islands.

The integrated geotectonic model by Dr Acharyya, besides explaining widely divergent, seemingly anomalous geological and geophysical data from the Himalayas and the Indo Burmese range, has several economic geological

ramifications. It specifically indicates future target areas for hydrocarbon exploration tracts in the Naga Hills and in the Himalayas, especially the areas below overthrust cover of older rocks, strata-bound pre-Tertiary polymetallic sulphide deposit, tin-tungsten and other mineral deposit locales in the Himalayas.

Dr Acharyya did his early education at Ranchi, and was placed first class first throughout his entire academic career at IIT, Kharagpur (1957-1962). He joined the Geological Survey of India as a Geologist in 1962. He was awarded D.Sc. degree from the University of Calcutta in 1976. In 1979, he was promoted as Director (Geology) in GSI. He is a member of several important scientific bodies and institutions. He is also a very keen naturalist and was an active member of the Asian Elephant Specialist Group of IUCN/SSC (1980-84). □

Acrylic resin emulsion binders NRDC award-winning invention*

With a view to developing a product which could act as a good binder for pigment on the surface of leather without any residual tack and with a good plate release on plating, the Central Leather Research Institute (CLRI), Madras, developed a process for the preparation of polymeric acrylic emulsions suitable for pigment fixing in leather finishing operations. The resin emulsions prepared by the CLRI process give a good flexible film on drying, and they are water dilutable and have good solubility and compatibility with the other anionic auxiliary materials.

The binders prepared with these emulsions exhibit outstanding stability and good adhesion to leather substrate. They form a film which has a

good water resistance. The binders have $38 \pm 2\%$ solid content; the pH of the emulsion is 6.5-6.8.

The main advantages of the CLRI process are: the reaction can be easily controlled, the yield is maximum, toxicity due to monomer is minimum, and the process is so simple that the commercial production can be carried out with the indigenously available stainless steel reactors.

The cost of production of the emulsion comes to Rs 20-22/kg, and its present market price is Rs 35-40/kg. The know-how of the process has been released to seven parties through the National Research Development Corporation of India.

Brief profiles of the inventors:

Dr S. Rajadurai

With CLRI since 1960, Dr Rajadurai is at present head of its Leather Auxiliaries Division. He did his Ph.D. from the Madras University in 1957 and started

his career as a National Research Fellow in the Presidency College, Madras, where he made substantial contribution towards the isolation, characterization and synthesis of natural products, while working with Prof. T.R. Govindachari.



At CLRI, he worked up to 1965 on the isolation and characterization of vegetable tannins. During this period he was also a research guide to many students. From 1965 to date he is engaged in the research and development of leather chemicals such as syntans, lacquers, lacquer emulsions, acrylic emulsions and polyurethanes, which are used in leather processing. He is responsible along with his team for the development of a series of syntans and leather finishing auxiliaries which are now commercially exploited by several multi-national and Indian firms.

Dr Rajadurai visited USA, UK, FRG, Austria and Bulgaria under UNDP and NSF sponsorship to have first hand knowledge on the latest techniques adopted by those countries in leather processing using polymeric materials.

So far 12 research fellows have got their Ph.D. under his guidance. He has more than 130 research papers, and 6 patents to his credit. He has served as a member of several academic societies, ISI, doctoral committees of several universities, etc. He is a Honorary Professor of the Anna University taking classes for B. Tech. and M. Tech. students. He is a recipient of Prof. B.B. Dey Commemoration prize for organic chemistry and the Indian Paint Association award for polyurethane.

*The announcement of the National Research Development Corporation of India's 1986 Republic Day award for a team of four CLRI scientists who have developed 'acrylic resin emulsion binders' has been made in *CSIR News*, 36 (1986), 13.

Dr K.S.V. Srinivasan

Dr Srinivasan (born 28 Sep. 1944) obtained his Ph.D. degree from the University of Madras in 1972, the title of his Ph.D. thesis being 'Dilute solution



properties of homo and copolymers'. He joined CLRI in the year 1975 and since then has been working in the area of synthesis and characterization of polymers, modification of polymers by graft copolymerization, immobilization of enzymes and microemulsions.

He synthesized and characterized the first polymer containing Si-Si linkage which acts as a semiconductor, with Prof. Robert West, Prof. Hyuk YU and coworkers during his visit to the University of Wisconsin, Madison, USA. He was also associated with Prof. Robert W. Lenz, University of Massachusetts in 1977, and carried out research on high temperature siloxanes. He investigated the stress reactions on cellulose with Prof. David Hon at VPI & State University, Blacksburg, during 1981-82.

He has published about 35 papers in international journals of repute and has one Indian and one Japanese patent to his credit.

Shri K. Parthasarathi

Shri Parthasarathi after obtaining Diploma in Leather Technology in 1959, worked for an year in a mechanized and modern commercial establishment in Bangalore, which was producing a variety of finished leathers (light leathers). Then he took to the teaching profession in Andhra Pradesh and trained a number of persons in the manufacture of different types of leathers, for a period of two years. He joined CLRI in 1963 and since then has

been working on research and development of newer processes and products. He is responsible for developing a number of products and processes and has conducted several demonstrations both in CLRI and outside for the benefit of large, medium and small-scale tanners. He is also associated with



technical training programme, experimental production scheme, leather auxiliaries developmental projects, project reports preparation, techno-economical survey, technology transfer and tanning and finishing activities of the institute. He is author of more than 60 papers and is a honorary lecturer in leather technology in the Anna University.

Shri K. Ananda Dev

Shri Ananda Dev's field of specializ-

ation is R&D of synthetic tanning agents, fatliquors, acrylic binders, lacquer and lacquer emulsion, etc. used in leather processing. Many of the tanning agents and finishing auxiliaries



developed by him along with other scientists of the leather auxiliaries area are now commercially exploited by many multi-national and Indian firms. He has more than 15 research papers and two patents to his credit. □

Crown Prince of Norway visits NIO

Their Royal Highness the Crown Prince Herald of Norway and Princess Sonja visited the National Institute of Oceanography, Goa, on 9 February 1986. They were accompanied by senior



Their Royal Highness Crown Prince Herald and Princess Sonja of Norway at NIO, Goa

officials of the Norwegian Government and score of journalists and TV staff. The royal couple was taken round the various laboratories of the institute. The visit of the royal couple was particularly significant in view of the Norwegian assistance under the NORAD programme for two ongoing projects of NIO: (i) Coastal zone management, and (ii) Geological and geophysical surveys. Financial assistance to a tune of N.Kr. 16 million has been provided since 1976 for these two projects, which has been utilized for procuring sophisticated equipment, including computers, and for training of NIO scientists and technicians in Norway, for collection, processing and interpretation of data and for maintenance and operation of equipment. Many Norwegian experts have visited NIO under these projects. The Prince was apprised of the progress and achievements of these projects. □

Ethiopian S&T Study Group visits PID

A five-member study group on Science & Technology from Ethiopia visited the Publications & Information Directorate, New Delhi, on 20 February 1986.

The group comprised: Kebede Tessema, Electrical Engineer, Central Planning Office, Government of Ethiopia; Dr Solomon Alemu, Hydraulic Engineer, Addis Ababa University; Dr Debre Worq Lewde, Immunologist, Ministry of Health; Brhane Worku, Water Engineer, National Water Resources Commission and Aweke Aynalem, Agonomist, Ministry of Agriculture. Shri S.P. Ambasta, Editor-in-Chief, PID, discussed with the study group the various aspects of science and technology communication and apprised it with the current activities of PID in collection and dissemination of information in science and technology. □

PROGRESS REPORTS

IIP Annual Report: 1984-85

The annual report of the Indian Institute of Petroleum (IIP), Dehra Dun, for the year 1984-85, shows that the institute has made several significant contributions to the growth and development of the petroleum industry, during the period.

The erection of the aromatic extraction unit, based on IIP-EIL process, at

the Bharat Petroleum Refinery, Bombay, was completed and commissioning work taken up. For further improvement of the process design, IIP set up a pilot plant for raffinate wash.

The naphtha pretreater and catalytic reforming unit at the Bongaigaon Refinery and the Petrochemicals Ltd, based on IIP-IFP process, were commissioned and guarantee runs were successfully completed. The capacity of these is 80,000 tonnes/annum.

For the various expansion and revamping programmes of the refineries, extensive studies were made on the processing of North Gujarat crudes at the Koyali Refinery, covering lube and bitumen production from some isolated heavy crudes of this field and visbreaking of short residue.

Investigations for revamping and expansion of the Haldia lube unit and the Digboi refinery wax plant were also completed. Pilot plant visbreaking studies aimed at offering a process for the proposed visbreaker unit at Karnal refinery, under the PPDCG programmes, were carried out.

The Associated Cement Company, to whom the know-how for the manufacture of reforming catalyst was licensed, produced, after solving several scale-up problems, larger batches, which were found to be of fully acceptable quality.

Substantial progress was made on the project on 'Application of methanol in diesel engines and 2-stroke engines'. In the 2-stroke engines, 10-15% improvement in energy efficiency could be obtained with the use of methanol as compared to gasoline. Field trials on driveability with the part use of methanol in diesel buses and two-stroke vehicles were taken up with a fleet of 14 vehicles. A total built of 144,000 km is aimed.

A heavy duty chassis dynamometer for trucks and buses was installed and commissioned. It is capable of simulating road load characteristics of 20 types of vehicles and would be used for



Seen with the Ethiopian study group is PID's Editor-in-Chief, Shri S.P. Ambasta (centre); in the extreme right is Shri K. Satyanarayana, Editor, PID

emission, fuel efficiency and alternative fuel studies.

The construction of the new 'Combustion Block' was completed and the industrial combustion laboratories were shifted to this block. Amongst the other new major facilities set up during the year are a transient mode engine dynamometer and a Pye-Unichem atomic absorption unit. A new laboratory for wax crystallization, wax chemistry, additive interaction and rheology studies was established under an Oil Industry Development Board programme.

A state-of-art report on vehicular exhaust emissions was prepared for the Department of Environment to pave way for evolving a national strategy and action plan for control of exhaust emissions in the country. During the year, another 500 IIP thin film industrial burners of improved efficiency were installed by various industries. These are estimated to result in an annual saving of about Rs 2 crores worth of fuel oil.

Techno-economic studies taken up for the industry included: De-aromatization of naphtha and kerosene, establishment of a LAB plant of 50,000 tonnes/annum, production of butane based petrochemicals.

An advanced level course on fluid catalytic cracking (FCC), and two courses on refining technology and engineering were organized.

The institute continued to provide effective technical inputs to various expert committees and government agencies like the Indian Standards Institution, Petroleum Conservation Research Association, Advisory Board on Energy, Department of Environment and the Department of Non-conventional Energy Sources. It played an effective role in the development of the Seventh Five Year S&T Plan of the petroleum sector and the CSIR plan for petroleum and chemical sectors.

Twenty-seven research investigations were completed and 139 technical reports were brought out during the

year. Eighty-three scientific papers were published/presented. □

NEW PUBLICATIONS

Pineapple—An Industrial Profile

The title publication of the Central Food Technological Research Institute (CFTRI), Mysore, is meant for the entrepreneurs setting up pineapple processing units. It has nine chapters which cover: raw materials—area and yield; post-harvest handling; technology of processing; specifications of raw materials and finished products; processing industry; utilization of pineapple processing waste; waste and effluent disposal and sanitation; scheme for a pineapple processing unit; and equipment and their availability. Statistical information is given in seven appendices.

The publication (royal 8vo, pp 62, Rs 15) can be had from: Head, FOSTIS, CFTRI, Mysore 570013.

Pepper—A Profile

The title publication of the Central Food Technological Research Institute (CFTRI), Mysore, is a comprehensive source of information on pepper covering all aspects from farm level to the end use: cultivation; production; processing, handling & grading; microbiological aspects; foreign trade; and standards & specifications.

The publication (royal 8vo, pp 44, Rs 15) can be had from: Head, FOSTIS, CFTRI, Mysore 570013. □

TRAINING COURSES

Environmental Pollution Control

A 15-day training course on environmental pollution control was organized by the Basic Research & Training Division of the National Environmental Engineering Research Institute (NEERI), Nagpur, for the staff of Indian Oil Corporation Ltd (IOC), during 13-31 January 1986 at Nagpur.

The course, sponsored by IOC, covered various aspects of pollution control involving water and wastewater treatment, air pollution and meteorological aspects, solid waste management and noise pollution control.

In all 24 staff members of IOC belonging to operation, production, pipelines, pollution control, and technical services took part in this course. About 30 faculty members from NEERI were involved in this course. The course was coordinated by the Pollution Control Wing of IOC, New Delhi.

* * *

Low Cost Housing

A training course on Low Cost Housing was jointly organized by the Central Building Research Institute's Extension Centre, Hyderabad, and the Ministry of Rural Development, National Building Organisation—Rural Housing Wing, Bangalore; and the A.P. State Housing Corporation, Hyderabad, during 6-9 January 1986 for the functionaries engaged in the National Rural Employment Programme (NREP) and Rural Landless Employment Programme (RLEP). About 60 members drawn from different districts of Andhra Pradesh participated in the course which was inaugurated by the A.P. Housing Minister, Shri N. Yethiraja Rao and presided over by Shri K.R. Rao, Minister for Rural Development and Panchayat Raj. Besides delivering technical lectures to the trainees, the Hyderabad Centre participated by way of putting up relevant display charts of CBRI and taking the trainees round the housing projects under construction with CBRI techniques in and around Hyderabad.

* * *

Water Desalination

A five day training course on Water Desalination, sponsored by the Ministry of Urban Development, was conducted at the Central Salt & Marine Chemicals Research Institute, Bhav-

nagar, during 10-14 February 1986 for the benefit of public health engineers nominated by the state governments. Sixteen engineers from six states including union territory of Andaman and Nicobar islands participated in the training programme.

The course included general desalination techniques with emphasis on reverse osmosis, electrodialysis and solar distillation processes. The topics covered were related to pre-treatment practice and post-treatment methods, water analysis, corrosion in desalination plants, design and engineering of different configurations, operation and maintenance of desalination plants, etc. In all 10 lectures were delivered during the course. Practical training on water analysis and plant operation was also provided. Field visits were arranged to Malika and Adilsar villages where reverse osmosis and electrodialysis plants are in operation. □

PERSONNEL NEWS

Appointments/Promotions

Dr M.N. Keshava Rao

Dr M.N. Keshava Rao, Scientist EII, Structural Engineering Research Centre (SERC), Madras, has been promoted as Scientist F with effect from 1 February 1986.



Dr Keshava Rao obtained his B.Sc. degree from the Central College, Bangalore, in 1952 and received the Tate Memorial Prize that year from the Mysore University. He got his Associateship and later M.I.E. of the Institution of Engineers in 1966. He was deputed to UK under the Colombo Plan and obtained his Ph.D. in Structural Engineering from the University of

Southampton, UK, in 1970. His thesis was on 'Optimum elastic design of frames and plates by nonlinear programming and fully stressed design methods.'

He worked in the Indian Institute of Science, Bangalore, from 1953 to 1958 and then joined the Central Building Research Institute, Roorkee, in 1958. He was transferred to SERC, Roorkee, in 1965 and to SERC, Madras, in 1978. He was a UN Expert at the Building Research Station, Iraq, for a short period in 1973, and visited FRG under the DAAD programme in 1980.

Dr Keshava Rao has been very closely associated with computers and their applications to engineering since 1964. He was the Head of Computer Centre for eight years at SERC, Roorkee. He gave lectures to university students, and coordinated courses on computer applications for a large number of engineering professionals in the early days of computers in India. He published a book on 'Fortran Programming', the first Indian book on the subject, in early 1967, which was revised in collaboration with another author in 1980, and has been recently published as a National Book Trust edition. He has developed and has been closely associated with the development of utility and engineering computer software systems in several R&D projects.

He is at present Editor of the *Journal of Structural Engineering*, a quarterly, published by SERC, Madras, since its founding in 1973. A reviewer of technical books and research papers for several journals in India and abroad, Dr Keshava Rao has examined many Ph.D. and M.E. theses for universities and IITs. He has published more than 40 papers and reports in India and abroad, in several areas of structural engineering, like plates and shells, computer analysis, numerical methods in engineering, optimization, finite element method, structural dynamics, vibrations, probabilistic mechanics, reliability analysis and offshore structures.

He has worked on more than 30 major structural design and consultancy projects taken up by SERC for Indian industries, public and private sector organizations and government departments, involving tall steel towers for TV or microwave transmission, power transmission line towers, bridges, complex RC frames and special purpose buildings, cooling towers, large-span shell roofs, etc. All projects involved complex and unusual elements. He has been a member of the Computer Society of India for several years and is a member of several committees of the Indian Standards Institution.

* * *

At the National Institute of Science, Technology, and Development Studies (NISTADS), New Delhi, the following have been promoted on assessment (with effect from the dates given in the parentheses):

As Scientist EII

Shri V.B. Lal (1 July 1985)

As Scientist C

Dr P.S. Datta (21 March 1984) and Smt. S. Visalakshi (1 Feb. 1986).

Honours & Awards

Shri Shamim Akhtar Ansari

Shri Shamim Akhtar Ansari, a CSIR research fellow at the Botany Department, Aligarh Muslim University, Aligarh, received the 'best presentation award' for his paper entitled 'Effects of pyridoxine on the growth and development of summer moong (*Vigna radiata* L. Wilczek) cv. K-851' at the VIII All India Botanical Conference held at Osmania University, Hyderabad, during 28-30 December 1985.

Retirements

Dr B.S. Jangi

Dr B.S. Jangi, Editor, *Indian Journal of Experimental Biology* and *Indian Journal of Biochemistry & Biophysics* retired on 31 March 1986. □



CSIR NEWS

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Indo-Czech Science Cooperation Programme

The delegations of the Council of Scientific & Industrial Research and the Czechoslovak Academy of Sciences held discussions in New Delhi from 12 to 19 March 1986, and reviewed the science cooperation between the two bodies during 1981-85 and finalized the fresh programme for 1986-88. The delegations, during these discussions, noted that the cooperation has been specially successful in the areas of polymers; modern instrumental me-

thods of analysis; geophysical methods of investigation of lithosphere and ionosphere; molecular biology and applied microbiology; physiological, psychophysiological research of mechanisms of yogic exercises and research in ecosystems, their components and preservation of gene pool. The fresh programme, along with all the items from existing programme, includes new areas such as cryogenic devices and systems; super conductivity and Josephson effect; micro electronics plasma techniques in surface processing; biochemical mechanisms and effects of new

antihelminthosis preparations; electrochemical reactions/porous electrodes; radio and atmospheric physics and scientific and bio-medical instrumentation.

The delegation of the Czechoslovak Academy of Sciences was led by Academician Ctibor Dostalek, Director of the Institute of Physiological Regulations of Czechoslovak Academy of Sciences and Member of the Presidium of the Academy. Academician Norbert Szuttor, Director of the Institute of Materials and Mechanics of Machines of the Slovak Academy of Sciences and Dr Hana Netukova of the Foreign Relations Department of the Czechoslovak Academy were the other members.

The Indian delegation was led by Dr P.K. Ray, Director, Industrial Toxicology Research Centre, Lucknow and consisted of Dr Kailash Chandra, Acting Director, National Physical Laboratory, New Delhi; Dr R.A. Mashelkar, Deputy Director, National Chemical Laboratory, Pune, Shri K.N. Johry, Head, International Scientific Collaboration (ISC), CSIR, and Shri B.C. Sharma, Scientist, ISC. □



Dr P.K. Ray, Director, ITRC, Lucknow (leader of the Indian delegation) and Academician Ctibor Dostalek, Director, Institute of Physiological Regulations of the Czechoslovak Academy of Sciences and Member of the Presidium of the Academy (leader of the Czechoslovak delegation) at the meeting of the two delegations which finalized the Indo-Czech Science Programme for 1986-88, in New Delhi.

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CSIR-NRDC-Industry Get-together

A national level CSIR-NRDC-Industry Get-together attended by over 300 participants from industry, government and R&D deliberated on issues of technology upscaling and proving, technology absorption and adaptation and new funding mechanisms for the purpose. Shri. N.D. Tiwari, Union Industry Minister, inaugurated the get-together, Shri Shivraj V Patil, Minister of State for Science & Technology and Vice President, CSIR, presided. The speakers included eminent industrialists and consultants, distinguished scientists and government policy makers.

Shri Tiwari, in his inaugural address said that the government was taking strong measures to ensure that repetitive import of the same technology from different countries was avoided and that extension of foreign collaboration after the period of the agreement was actively discouraged. He called upon industry to evolve a symbiotic relationship with R&D, particularly in the national laboratories. He advocated the setting up of 'Technological Parks' by national laboratories in association with industry for the benefit of small and medium scale industries. He also urged that the setting up of the National Register of Foreign Collaborations by the Department of Scientific and Industrial Research be actively pursued and made up to date during 1986-87.

Shri Patil, in his presidential address, stressed that persons from industry should visit R&D laboratories more frequently to familiarize themselves with the work being done and the expertise available there. In-house R&D units should be strengthened to absorb and adapt technology. All industrial units may not have the resources to take up meaningful R&D, therefore, units with common interests could jointly sponsor work to national laboratories, Shri Patil suggested.

Shri R.P. Goenka, President of FICCI, suggested the setting up of a

national level body to make an overall assessment of the country's technological requirements and to decide which of them needed to be met from local R&D and which should involve foreign technology.

The get-together made the following recommendations:

1. Recognizing the record of CSIR as a generator of commercially viable technologies and having the potential to do more in this regard, the get-together recommended that the Council should build formal linkages with industry associations both in the private and public sectors. It also took note of the fact that the inputs for technology upscaling and proving could not be provided solely by the R&D laboratories; engineering consultants, industry and government also had major roles to play.

2. The government should revise its fiscal and financial policies to provide strong commercial and financial incentives for entrepreneurs to take up and use indigenous technology. Industries based on know-how from national laboratories should be given excise exemption, concessional duty on imported items, higher debt equity ratio.

3. The re-activation of state level industrial R&D groups for interaction with small and medium scale industries should be taken up on an emergent basis.

4. An important recommendation pertained to the continuance of the Indian Patents Act, 1970, in its present form because of the many benefits it accords to R&D, industry and consumers.

Dr A.P. Mitra, Secretary, Department of Scientific & Industrial Research and Director General, CSIR, assured the participants that CSIR would actively pursue the implementation of the recommendations and wherever warranted necessary dialogue would be initiated with government departments and industry associations for this purpose. □

National Workshop on Catalysis and Catalysts in Chemical Industries

The 3rd National Workshop on Catalysis and Catalysts in Chemical Industries was held on 10-11 February 1986 at Bhubaneswar under the joint auspices of the Regional Research Laboratory, Bhubaneswar and the Catalysis Society of India. Shri K. Ramamurty, Vice-Chancellor, Orissa University of Agriculture and Technology, Bhubaneswar, inaugurated the workshop. Shri K.N. Venkatasubramanian, Executive Director, Indian Petrochemicals Corporation Limited (IPCL), Baroda, was the Guest of Honour; Prof. V. Srinivasan, President, Catalysis Society of India, presided over the inaugural function.

In his welcome address, Prof. P.K. Jena, Director, RRL-Bhubaneswar, and Chairman, Steering Committee of the workshop, emphasized the extensive use of catalysts in the preparation of important industrial chemicals such as mineral acids, ammonia, petrochemicals, fertilizers, fuels, pharmaceuticals and food products. As India has large resources of natural gas, the economic utilization of this gas, say, for synthesis of fuels and production of modern materials would have enormous impact on our socio-economic development, Prof. Jena said. Also, there is a lot of scope for utilization of solar energy and biomass. New and improved catalysts for this purpose should be our top priority. As most of the drug-, pharmaceutical-, and fine chemical-manufacturing processes involve catalysts, utmost importance should be given to the development of catalysts in these areas. Prof. Jena pointed out that more emphasis should be given to the regeneration of precious metal catalysts which are indispensable to our petroleum and petrochemical industries, since our country imports all its requirements of platinum, palladium, rhodium, etc.

Dr B.N. Pande, Governor of Orissa, in his address (read in absentia by Dr T.S.R. Prasad Rao, Secretary, Catalysis Society of India), expressed his happiness over the R&D work of the Bhubaneswar laboratory in the field of catalysis, particularly the new method of homogeneous precipitation for the preparation of platinum-on-alumina, iron-chromium oxide and bismuth molybdate catalysts. Dr Pande also emphasized the need for development of new catalysts, particularly for the fertilizer, petrochemical and chemical industries, which are based on imported technology.

Shri K. Ramamurty, in his address, mentioned that catalysts were increasingly being used for the utilization of agricultural wastes and biomass. He suggested that with ethyl alcohol as starting material, a large number of organic chemical industries might be set up for catalytic dehydration, dehydrogenation, oxidation, etc. He predicted that the enzymatic decomposition of biomass would revolutionize the production of biogas in the rural areas in future.

Shri Venkatasubramanian in his address emphasized the industrial applications of catalysts with specific reference to petrochemical products. He pointed out that in order to make the country self-sufficient and to achieve commercial breakthrough in the area of catalysis, scientists from different disciplines, working in various research, academic and industrial institutions must come together and share their expertise in developing catalysts required for various industries.

Prof. V. Srinivasan, in his presidential address, presented a brief history of the Catalysis Society of India, its objectives and activities. He informed that in order to honour the significant contributions in the field of catalysis in the country, the society has instituted an Eminent Scientist's Award and a Young Scientist's Incentive Award.

A panel discussion was held on 11 February 1986 under the chairmanship

of Dr K.S. Narasimhan of RRL-Bhubaneswar. The panel recommended that there should be a national policy on catalyst development and catalysis society should be consulted in this matter. The panel emphasized the importance of fundamental research, interdisciplinary collaboration and identification of mission oriented projects. The catalysts developed in the country should be tailor made to suit the needs of the country. Since the R&D on catalysts involved costly equipment, the panel felt that the Department of Science and Technology should provide adequate funds to research organizations and universities. The importance of sharing of facilities was also discussed. □

Soak cleaning compound for steel contaminated with oil

The Indian Pulverizing and Processing Company, Pune, has commenced production of soak cleaning compound based on the technology developed at the Central Electrochemical Research Institute, Karaikudi.

Mineral oils, vegetable oils and greases are usually applied to various surfaces for corrosion protection during transit and storage. It is essential to remove these oils and greases before painting. The soak cleaning compound developed at CECRI effectively removes all types of mineral oils, vegetable oils and greases. □

Multipurpose resin intermediate from cashewnut shell liquid

The Regional Research Laboratory, Trivandrum, has developed a multipurpose resin intermediate as a reaction product of cashewnut shell liquid and phosphoric acid. Gel permeation chromatographic data have indicated the resin to be a mixture of monomer, dimer and trimer. The process has been scaled up to 50 kg level in collaboration with the Vikram Sarabhai Space Centre,

Trivandrum. A similar resin has also been prepared and scaled up based on cardanol.

Some of the chemical and physical properties of the resin are: hydroxyl value, 4.8 mg of KOH; acid value, 14.68; iodine value, 106.7; unreacted phosphoric acid, 0.17%; specific gravity, 1.294; moisture content, negligible; ash content, 1.33%; and viscosity, 4,800,000 CPS. The viscosity of the resin based on cardanol was rather less but other properties were similar.

The resin could be processed into a number of products such as break lining, adhesive and fire retardant formulations. When processed into brake linings, there was a 40% improvement in mechanical properties over the unmodified CNSL based brake linings. Improvements in frictional properties are also expected. The results obtained through collaborative work with the Automotive Research Association of India, Pune, were encouraging.

An adhesive formulation based on the new resin showed an improvement of 300% in lap shear strength over the unmodified CNSL resin. Fire retardant tests on the resin showed no propagation of fire and no afterglow indicating the resin to be a good fire retardant. Additional plus points include water proofing qualities, acid and solvent resistance, etc. of the final product. □

Exhibition on CSIR Technologies on Fire Hazard Mitigation and Construction

An exhibition on CSIR Technologies on Fire Hazard Mitigation and New Building Materials and Construction Techniques was held at Vigyan Kendra, New Delhi, on 25 March 1986. The exhibits were related to the R&D work of the Central Building Research Institute, Roorkee, and included fire retardants for cotton shaminas, carpets, curtains and thatch, fire detection alarm technique, automatic sprinklers, automatic roof vent, and liquid and

metal fire quenching systems. Building materials, and construction techniques for school buildings, rural buildings, etc. were also displayed.

Air Vice Marshal H.L. Kapur, Lt. Governor of Delhi, inaugurated the exhibition. □

Rural Science Fair 1986

The Rural Science Forum of the Central Electrochemical Research Institute (CECRI), Karaikudi, and the Village Planning Forum, Kundrakudi, jointly organized a rural science fair during 25-27 January 1986 at Devakottai, Pasumpon Muthuramalingam District, Tamil Nadu, in order to popularize the various developments in the fields of science and technology among the rural people and among the students and teachers of the rural schools in and around Devakottai and Karaikudi.

Twenty schools in and around Devakottai and Karaikudi, and other organizations numbering 29, participated in the fair. About 15,000 visitors, many of them students from various schools in rural areas, visited the fair. □

Community structure of intertidal fauna at Dona Paula beach

Amongst diverse marine ecosystems, the biota between the tide marks is most crucial for the overall productivity of an ocean. Shri C.L. Rodrigues, a CSIR senior research fellow, while working on the biotic and environmental components and their interactions within a sheltered sandy beach, having both the marine and estuarine influence, observed that the coarsest particles lie at the top and grade down to finest sediments at the waterline. The beach slope correlates with the wave action. The sediments are thixotrophic and favour the abundance of burrowers.

During the monsoon, the chlorophyll and organic carbon levels are low due to erosion, while pheopigments are high. Benthic organisms regenerate the nutrients on a large scale. Out of the seventy species recorded from the study

area, Amphipods (40.3%), Polychaetes (32.5%) and Isopods (11.1%) are the important groups. Biota is dominated by deposit feeders. While recruitment takes place round the year, the population density of the various species declines during the monsoon.

Macrofaunal zonation is not discernible and is closely related to the magnitude of wave energy. The meiofauna, abundantly found in the top five centimeters of the sediment, is mainly concentrated in the mid-littoral zone, and the distribution is controlled by grain size. Distribution and abundance of fauna displays contingency. Faunal diversity, which is high, increases towards the infralittoral zone, where a stable community flourishes. Results indicate that the species have

wide niches which due to overlapping, permit coexistence.

By developing appropriate computer programmes, the community structure and metabolism was further studied on an organism level. It was observed that the sediment characteristics and the organic carbon content of the sediment, in addition to the flora manifested by chlorophyll which forms the food of the inhabitants, play an important role in the distribution, abundance and community formation of biota at Dona Paula beach. Salinity provides an impetus for reproduction.

Shri Rodrigues was awarded Ph.D. degree by the University of Poona, for his studies carried out under the guidance of Dr A.H. Parulekar of NIO.

NATURAL RADIONUCLIDES: APPLICATION TO STUDY AQUEOUS GEOCHEMICAL PROCESSES

Bhatnagar Prize-winner Dr Krishnaswami's Work

Dr Krishnaswami's research centres around environmental radioactivity with emphasis on the application of natural radionuclides to problems in oceanography, limnology, hydrology and geochemistry. During the past two decades the application of natural radionuclides and trace elements has led to considerable advances in our understanding of several surficial geochemical processes. Dr Krishnaswami has contributed significantly to several of these developments, particularly in the study of aqueous geochemical processes.

Dr Krishnaswami was the first to suggest and demonstrate the application of naturally occurring ^{210}Pb (half-life 22 yrs) as a powerful tracer to date recent lake sediments. This method is particularly suitable for a period of time (0-100 yrs) which has witnessed considerable changes in the environment due to

human activities (industrialization and cultural effects). In recent years this ^{210}Pb dating method has become the most commonly used dating technique to chronologically decipher historical records of natural events and anthropogenic disturbances contained in lake and coastal sediments.



Dr S. Krishnaswami, Physical Research Laboratory, Ahmedabad, has been awarded the 1984 Shanti Swarup Bhatnagar Prize in earth sciences (along with Dr S.K. Acharyya of the Geological Survey of India, Calcutta) [*CSIR News*, 36 (1986), 29].

The widespread applications of the short-lived daughter nuclides of U-Th series to delineate mechanisms of scavenging process and to determine their kinetics in surface and deep waters of the oceans stem mainly from the work of Dr Krishnaswami and his colleagues. The extensive use of Th isotopes and ^{210}Pb by scientists from many international laboratories, to study particle-water interactions and to infer

fate of reactive pollutants in the oceans, has resulted from their discovery of ^{234}Th , ^{238}U and ^{210}Pb - ^{226}Ra radioactive disequilibria in the oceans. This is because thorium isotopes and ^{210}Pb trace the pathways by which reactive chemical substances are removed from the ocean waters. This study is of direct relevance to radioactive contamination and waste disposal in the ocean and provides an understanding of how the oceans assimilate materials added to them. More recently, Dr Krishnaswami's interest has been focussed on the nuclide removal processes in subsurface aquifer systems.

The work of Dr Krishnaswami and coworkers on the radioactive dating of polymetallic nodules, recovered from the ocean floor, has resolved some of the major controversies regarding their growth rates. Their ideas and supporting experimental evidences have unequivocally established that these deposits indeed grow at rates of few mm per million years.

The last few years witnessed a considerable growth of activities in the field of marine particulate matter. Dr Krishnaswami and his coworkers were one of the first to recognize the crucial role of marine suspended phases in controlling the lateral and vertical distribution of radionuclides in the ocean. Their work as a part of the international GEOSECS programme constitutes the bulk of the data available today on the distribution, chemistry and dynamics of particulate matter in the oceans on a global scale. These results have led to major advances in our understanding of the particle-water interaction processes, elemental cycling through particulate phases and the settling characteristics of particles.

An important research programme in the forthcoming years would be to study the water column processes in the Arabian Sea and the Bay of Bengal and to decipher the historical records contained in their sediments. Dr Krishnaswami's group in collaboration with scientists from the National

Institute of Oceanography, Goa, is presently working on some of these problems.

Dr Krishnaswami (born, May 1945, Trivandrum) graduated from the University of Kerala in 1963 and joined the Geophysics Research Group at the Tata Institute of Fundamental Research (TIFR), Bombay in 1964. He obtained Ph.D. degree from the Bombay University, while working at TIFR. He became a member of the Physical Research Laboratory (PRL), Ahmedabad, in 1973, where he is presently serving as an Associate Professor. In

addition to TIFR and PRL, Dr Krishnaswami has also worked at the Scripps Institution of Oceanography, University of California and at the Department of Geology and Geophysics, Yale University.

During these years, Dr Krishnaswami has published about seventy research papers. He was awarded the Young Scientist Medal (1975) by the Indian National Science Academy and the Krishnan Medal (1981) by the Indian Geophysical Union. He is a member of many international and national scientific working groups. □

Ten Successful Years of R.V. *Gaveshani*

R.M.S. Bhargava*

The country's first oceanographic research vessel *Gaveshani* completed 10 years of successful operation in February 1986. The vessel belonging to the National Institute of Oceanography, Goa, was formally commissioned on 31 December 1975 and it started scientific cruises in February 1976. Prior to this, not much could be achieved in oceanographic research for want of a research vessel and the commissioning of the vessel gave much needed impetus to the oceanographic research in India.

R.V. *Gaveshani* was a hopper barge but redesigned and converted into a research vessel at the Garden Reach Workshop, Calcutta. This medium sized vessel is equipped for multidisciplinary oceanographic work during all seasons and is stabilized against rolling. The 68.33 m long ship has an endurance of 25 days and accommodation for 19 scientists and 51 ship's officers and crew. Since 1976, *Gaveshani* has been cruising in the Northern Indian Ocean. So far, 160 cruises have been completed. On an average the ship spends about 30 days in a year at sea. During these

cruises, more than 3000 stations have been worked out and a large amount of data on physical, chemical, biological and geological aspects have been collected to enhance our knowledge about the Indian seas. The ship has paid goodwill visits to Malaysia, Mauritius, Sri Lanka and Seychelles. Some of the major contributions made by *Gaveshani* in various fields are summarized below:

Living Resources

The biological characteristics of Indian waters have shown that the present marine fish catch of 1.5 million tonnes can be easily doubled. New spawning and rich fishing groups have been identified off Gujarat, Pondicherry and Lakshadweep by estimating the primary and secondary productions. The bottom living animals and seaweeds have been mapped and the role of bacteria in marine food cycle is being studied.

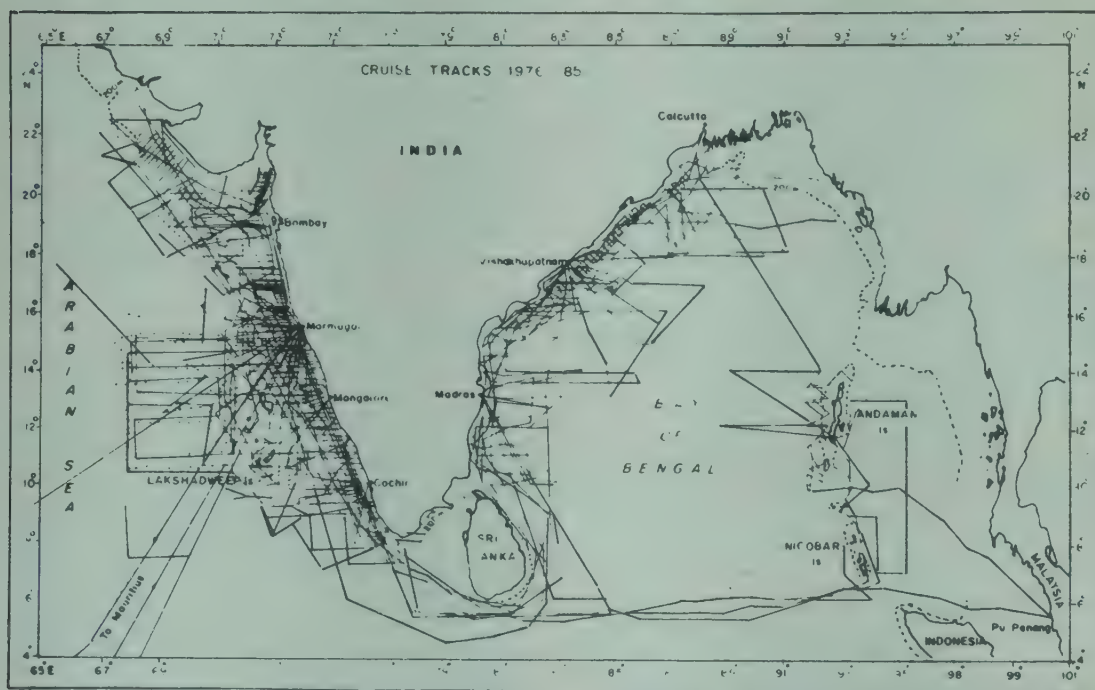
Non-Living Resources

During one of the cruises of *Gaveshani*, India's first sample of polymetallic nodules was scooped up from the Central Indian Ocean on 26 January 1981. These nodules can substitute the import of copper, nickel and cobalt in addition to supplying

*Shri R.M.S. Bhargava is Scientist, Information, Publication and Data Division of the National Institute of Oceanography, Goa.



Research Vessel Gaveshani



Cruise track of R.V. Gaveshani showing the area covered by the ship during the last ten years

plenty of iron and manganese. This made India the first among the developing countries and seventh in the world to achieve this distinction.

The surveys also located placer deposits of ilmenite on the Konkan coast to the tune of about 2 million tonnes.

The investigations by *Gaveshani* were extremely useful in mapping out the sea

bed mineral resources in the continental margin of India.

Pollution Control and Monitoring

Gaveshani has carried out observations along the oil tanker routes across the Arabian sea and the Bay of Bengal to study: (i) oil slicks, (ii) petroleum residues (tar like material), and (iii) dissolved and dispersed

hydrocarbons. The studies have concluded that though the Indian seas have been affected by the oil pollution but the state has not become alarming as yet.

The ship has been deployed under several sponsored projects to monitor pollution in Indian waters. Physical, chemical and biotic factors have been studied with a view to suggesting suitable discharge points for industrial effluent and sewage.

Monsoon Studies

Gaveshani participated in the programme of monsoon experiment (MONEX-79) sponsored by the Government of India as a part of global programme. The ship undertook six cruises in the Arabian Sea and the Bay of Bengal and collected oceanographic and meteorological data of great importance in understanding the monsoon patterns which are so vital for India.

Development of Harbours

The ship has contributed significantly towards the development of harbours on both the coasts of India by locating anomalous objects to facilitate navigational activity. Such main harbours being Visakhapatnam, Mormugao, Cochin and Mangalore.

Offshore Oil Fields

The surveys carried out by R.V. *Gaveshani* have helped in recommending pipeline routes from Bombay High to Bombay—on one of which ONGC laid the pipeline to transport crude oil and gas to shore; and recommending pipeline route from Bassein to Tarapur and Hajira in Gujarat; The research vessel has also carried out surveys for: designing production platforms; locating lost well heads; fixing the position and jacking up of drill ships like 'Sagar Samrat', 'Gattysherg', 'Shenandoah' and 'Chancellor's ville'; and controlling biofouling of offshore installations.

These surveys have led to self-reliance in the field and have saved the country foreign exchange worth millions of rupees.

Remote Sensing

Several cruises of R.V. *Gaveshani* have been utilized to collect ground truth data simultaneously with remote sensed data from satellite. Some of these ground truth parameters are sea surface, temperature, waves, ocean colour, chlorophyll, etc. This is a new field which is being developed in India.

Thermal Energy

Electric power can be generated by utilizing the thermal gradients in the sea. The ship has cruised some of the areas and collected baseline data on thermal structures for the possible sites for locating OTEC plant. The areas identified are off Lakshadweep and Pondicherry.

Training of Personnel

The requirement of trained manpower is increasing and R.V. *Gaveshani* has been deployed towards meeting this objective. Special cruises have been conducted for fresh graduates and scientists from other organizations and universities for on board training in operation of oceanographic instruments, collection and analysis of data. A large number of scientists from the universities of Calcutta, Andhra, Cochin, Annamalai, Bombay, Delhi, etc. have been trained.

International Activities

The ship has been deployed to work in the Exclusive Economic Zones of Sri Lanka, Mauritius and Seychelles. This has been done at the request of these governments. Special surveys have been conducted for polymetallic nodules and seaweeds, in addition to other oceanographic parameters, in EEZ of Mauritius and Seychelles. □

PERSONNEL NEWS

Prof. V.K. Gaur

The term of Chairmanship of the Coordination Council for physical and earth sciences group of Prof. V.K. Gaur, Director, National Geophysical Research Institute, Hyderabad, has been

extended by one year i.e. up to 31 March 1987.

Honours & Awards

Dr A.V. Rama Rao

Dr A.V. Rama Rao, Director, Regional Research Laboratory, Hyderabad, has been chosen for the Vividhlaxi Audyogik Samshodhan Vikas Kendra (VASVIK) award for the year 1984 for his contributions in the area of Chemical Sciences and Technology. The award carries cash prize of Rs 25,000 and a gold medal.

Dr V.R. Singh

Dr V.R. Singh of the National Physical Laboratory, New Delhi, has recently been elected as the Administrative Council Member of Asian Federation of Societies for Ultrasound in Medicine and Biology (AFSUMB), Japan. The AFSUMB is a newly formed body of Asian countries to disseminate knowledge and to promote co-operative effort in the use of ultrasonic techniques in biological and medical research and practice, all over the world.

IIP Scientists win silver medal at 46th All India Industrial Exhibition

Dr R. Krishna, Ms Anshu Sharma, Dr A.N. Goswami and Dr B.S. Rawat of the Indian Institute of Petroleum, Dehra Dun, have been awarded silver medal in the best invention category at the 46th All India Industrial Exhibition held at Hyderabad on 9 February 1986. The prize has been given for their work on 'Dearomatization of kerosene using aqueous surfactant liquid membrane.'

There is a limit on the concentration of aromatics in illuminants and ATF grade of kerosene due to the fact that aromatics cause smokiness of the flame, increase the 'skin' temperature and affect the sealants in aircraft engines. Typical Indian straight run kerosene, specially from eastern and Bombay High regions, have aromatics contents higher than this limit. Dearomatization is, therefore, a necessary step.

The present awardwinning invention is based on a novel separation technique called 'Liquid membrane permeation', first discovered by Norman Li of Exxon, USA, in 1971. By this invention it is possible to reduce the aromatics concentration in a typical straight run kerosene from the Bombay High crude oil from 25% to 18% in a single stage at ambient temperatures. Very small amount (0.3 to 0.4 wt. %) of surfactant is needed and the surfactant is available indigenously. The solvent required is a hydrocarbon stream readily available from any refinery.

At present, Indian refineries are using liquid sulphur dioxide extraction process for dearomatization of kerosenes. This is an obsolete process having several drawbacks, such as refrigeration to about -20°C and corrosion. Also, ATF specifications are not consistently met. Liquid membrane separation offers an attractive energy efficient alternative which is also simple because the operation is carried out at ambient temperature conditions. □

ANNOUNCEMENTS

CSC-CLRI Workshop on Leather Processing Technology

The Commonwealth Science Council in collaboration with the Central Leather Research Institute (CLRI), Madras, is organizing a regional workshop on Leather Processing Technology, on 5-9 May 1986 at CLRI.

The countries that will be represented at the workshop are Bangladesh, India, Malaysia, Mauritius, Papua New Guinea, Sri Lanka and Seychelles. One nominee from each country who is a senior leather technologist or a senior level research scientist working in the area of leather processing is expected to participate in the workshop. The main objective of this workshop is to familiarize the participants with modern processing techniques in leather technology, to acquaint them with the basics of tannery byproduct utilization and to promote collaborative endeavours in respect of training, co-operative surveys

and R&D efforts in the area of leather and allied fields.

2nd International Symposium on Beneficiation and Agglomeration

The Regional Research Laboratory, Bhubaneswar, in association with the Bhubaneswar Chapter, Indian Institute of Metals, will be organizing 2nd Symposium on Beneficiation and Agglomeration of Minerals, on 17-19 December 1986.

It is intended to focus attention on aspects of topical interest like fundamentals, simulation and modelling, technology suitable to complex ore deposits including high ash coals, modifications of existing plants for improved performance with recovery for reuse of valuable elements in wastes, agglomeration of ore fines and concentrates and bulk waste utilization as a step towards pollution control.

Original papers relating to the following topics are invited: (1) Mineral characterization of very fine particles; (2) Recent developments in techniques and methods of mineral processing for the recovery of fine particles and their agglomeration; (3) Pilot plant and plant experiences in processing of low grade ores, ore fines and concentrates; (4) Techniques and processes towards energy conservation in mineral processing and agglomeration; (5) Developments in the area of treatment of mining and metallurgical wastes; and (6) Characterization of agglomerates.

Intending authors are requested to send an abstract of 200 to 300 words of their papers before 31 May 1986. Pre-registration is essential for attending the conference. Participants will have to pay the registration fee (member: Rs 500, non-member: Rs 1000, delegates from abroad: \$ 200, student members: Rs 250, ladies: Rs 250 and ladies from abroad: \$ 50) through a cheque/draft drawn in favour of the State Bank of India, RRL Branch, Bhubaneswar—Account ISBA-86 not later than 31 August 1986. Further details can be had from: D.N. Dey, Convener, ISBA-86, Regional

Research Laboratory, Bhubaneswar 751 013. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

SENIOR RESEARCH FELLOWSHIP/RESEARCH ASSOCIATESHIP

Advertisement No. SRF/RA-EMR-1/86

Applications are invited from Indian nationals by the Council of Scientific & Industrial Research for the award of senior research fellowship/research associateship in all the subjects of science and technology including engineering & medicine. These will be tenable at universities, institutes of technology, medical colleges/institutes, centres of advanced studies, CSIR laboratories and other research/academic institutions. Preference will be given to the topics relevant to R&D programmes of CSIR laboratories, new and emerging fields in each scientific discipline and areas of national importance of science and technology. Good academic record at the university level, the research papers published in the standard journals and the topic of research to be undertaken will be the main criteria for selection. The fellowships/associateships will be subject to CSIR terms and conditions applicable from time to time.

SENIOR RESEARCH FELLOWSHIP IN SCIENCE SUBJECTS (Stipend Rs 1200/ p.m.)

Qualifications: Applicants should have M.Sc. or equivalent degree with at least two years' research experience after M.Sc. as evidenced by published papers in standard journals.

SENIOR RESEARCH FELLOWSHIP IN ENGINEERING & MEDICINE (Stipend Rs 1200/ p.m.)

Qualifications: Applicants should have M.E./M. Tech. in engineering or equivalent degree in engineering & technology or M.B.B.S. after completing internship.

Tenure: The tenure of an SRF in science subjects will be two years, extendable by one year. The tenure of an SRF in engineering and medicine will be two years extendable by a further period of two years if at the end of two years his/her work is found satisfactory by an assessment committee consisting of guide, head of the department and an external expert of the rank of professor in the relevant field.

Age: The upper age limit for senior research fellowship is 30 years as on 1 April 1986 (relaxable by three years for scheduled castes & scheduled tribes). In exceptional cases where a candidate is found to have outstanding ability, the age limit may be relaxed marginally at the discretion of CSIR.

Those who have held or are holding fellowships getting identical stipend may also apply but if selected they will be subject to the additional condition that their tenure as SRF together with such tenure of fellowship held earlier does not exceed three years in science subjects and four years in engineering/medical.

RESEARCH ASSOCIATESHIP

Qualifications: The applicants should have minimum Ph.D. or equivalent degree or M.D./M.S. or three years' research, design and development experience after M.E./M. Tech. or equivalent degree in engineering and technology.

Age: The upper age limit is 35 years as on 1 April 1986 (relaxable by three years for scheduled castes and scheduled tribes). Marginal relaxation in the period of R&D experience after M.E./M. Tech. Age relaxation may be considered for candidates having outstanding ability at the discretion of CSIR.

Tenure: The selected candidates will get monthly stipend in the range of Rs 1400 to Rs 2000 per month (fixed) for a period not exceeding five years with the provision of annual increase of Rs 100 as per rules.

CSIR reserves the right to place the selected candidates at any place considered suitable for the work other than the place from where the application has been forwarded.

How to apply: Application forms for the fellowship/associateship awards will be available from 21 April 1986 and may be obtained from the Under Secretary, EMR, CSIR, Rafi Marg, New Delhi-110001. Request for application form must be accompanied by a self-addressed envelope of the size of 15 × 25 cm (5½" × 9") with stamp of Re 1 affixed on it. Both the envelopes must be superscribed with 'Application form for SRF or RA' as the case may be. The form can also be obtained personally from CSIR Office at Rafi Marg, New Delhi, with a formal request. Application complete in all respect duly sponsored by the authorities of institutes/universities/research laboratories (where the candidate proposes to undertake research) alongwith copies of research papers, attested true copies of all relevant certificates, mark-sheets and testimonials (originals need not be sent) and a crossed Indian Postal Order of Rs 10 drawn in favour of the Joint Secretary (Administration), CSIR, payable at New Delhi Post Office should be sent by Registered Post addressed by name to Shri S.N. Rai, Under Secretary, EMR, CSIR, Rafi Marg, New Delhi 110001. The scheduled castes/tribes and the physically handicapped candidates are exempted from payment of application fee. Incomplete applications or applications received after closing date will not be considered. Last date for receipt of applications is 30 June 1986 (for remote areas 10 July 1986).

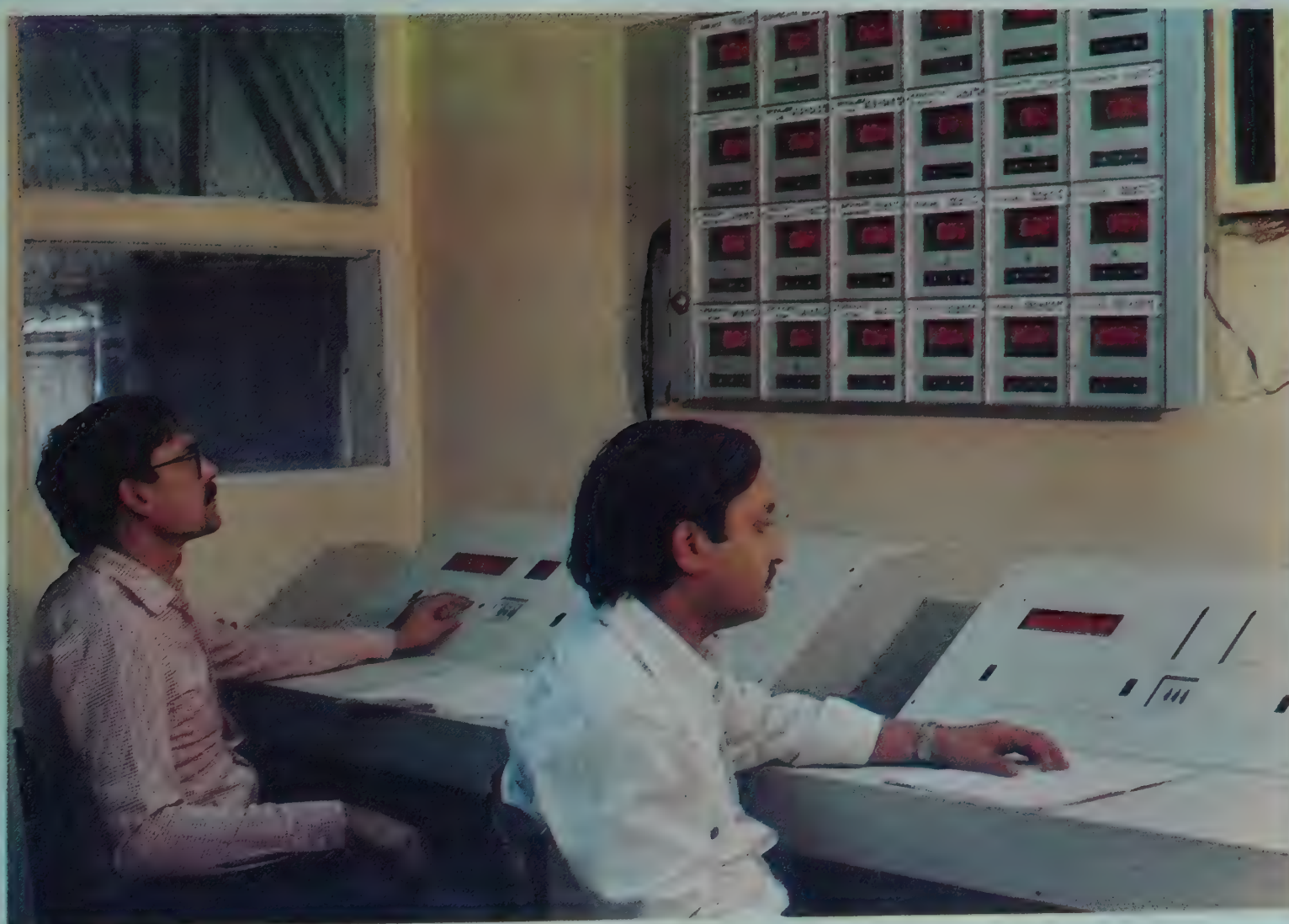
All the papers of the application must be stitched by thread or tag before posting to retain them together. The envelop containing the application must be superscribed with 'Application for SRF or RA' as the case may be. No application will be entertained after the last date is over. No interim enquiries will be attended to. Convassing in any form will be a disqualification. □

CSIR NEWS



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International Symposium on School Buildings for Afro-Asian Countries

The Central Building Research Institute (CBRI), Roorkee, organized a three-day International Symposium on School Buildings for Afro-Asian Countries during 12-14 March 1986, in collaboration with the Ministry of Human Resource and Development, HUDCO, DST and NCERT. About 120 delegates from India, Bangladesh, Burma, China, Ethiopia, Japan, Nepal and Thailand participated in the symposium whose main objective was to underline the importance of school buildings which formed basic infrastructure for the implementation of the new education policy, and to provide participants a forum for exchange of ideas and experiences on policy, planning, design and construction of more functional and economical school buildings.

Shri S.K. Sharma, Chairman and Managing Director, HUDCO, who inaugurated the symposium spoke on 'A

global search for suitable infrastructure for mass education'.

Dr R.K. Bhandari, Director, CBRI, in his welcome address pointed out that CBRI was deeply involved in research on school buildings and educational spaces for over the past two decades. The institute had developed technology for low cost construction making full use of local materials with optimum blend of man-machine mix, fully recognizing the socio-climatic variability across the country. He added that CBRI could willingly act as a nodal agency in the region by establishing a data bank to serve as a clearing house for information on latest technology for school buildings for Afro-Asian countries. Laying stress on an urgent need for training in the application of innovative, low cost and durable new technologies, Dr Bhandari said that CBRI would be glad to provide total technology package on

school buildings and to undertake training programmes at various levels ranging from training of craftsmen like masons to refresher courses for the in-service engineers.

The following recommendations emerged from the deliberations of the symposium:

1. While a substantial amount of research work was reported in this area further R&D needs to be carried out. This is particularly needed in the countries where it has not been possible to develop their own norms based on their research efforts and where it has become necessary to review and up date existing norms and standards. It was suggested that financial resources for supporting the R&D efforts need to be augmented both from national and international sources.

2. In view of the great diversity of the existing situation in the region space norms need to be drawn up taking into account all variations, particularly in the traditional constructional techniques, local skills, climate and financial resources. Experience indicates that rigid application and unimaginative interpretation of norms can lead to sterile learning space. School being a focal point of community activity, holistic approach to school design will result in multiple use of space and efficient school plan.

3. Lack of financial resources is not the only constraint in the Afro-Asian countries in reaching education. Other resources such as space, climate, and the 'will to learn and teach' should be fully exploited. School buildings and the open spaces with them should not function merely for the purpose of educating children but should be conceived and used as a place of social activities and interaction. It is appropriate time to direct research on how to use the media to fill the gap between supply and demand for education and to update the quality of education imparted to the new generation.



At the inaugural session of the International Symposium on School Buildings for Afro-Asian Countries seen on the dais (from left) are: Dr S.K. Misra, Scientist Coordinator (Information) CBRI; Shri T.N. Gupta, Chairman, Organizing Committee, CBRI; Shri S.K. Sharma, Chairman & Managing Director, HUDCO; Dr R.K. Bhandari, Director, CBRI, and Shri V.K. Mathur, Symposium Coordinator, CBRI

4. Resource allocation for the construction of schools in rural areas should be enhanced. To supplement the efforts of government, rural community should be encouraged to construct their own schools.

5. Low cost construction techniques incorporating measures against earthquake, cyclone and other natural disasters need to be implemented.

6. Installation of low cost sanitary latrines and arrangements of potable water supply should be essential in existing and future schools.

7. The schools should accommodate informal education as well as work-oriented activities, which are becoming more individualized with consequent change of content, method and support services. They should also provide for the optimal use of computers and audio-visual aids including video, TV, etc.

8. Priority should be given to upgrade the existing school buildings in terms of planning as well as construction. This will help in increasing the school buildings stock to meet the heavy backlog and the requirements for the future.

9. Mechanism should be worked out to establish strong relationship between the initial cost of construction and maintenance cost. A comparative analysis of short term cost saving versus long term advantage should be made available in quantitative terms.

10. Regional cooperation on educational buildings and other physical facilities be strengthened through the development of an information network and through regional meetings such as the current symposium.

11. Advantage should be made of the substantial services of CBRI which are now available to other countries of the region as well.

The symposium ended with a vote of thanks from Shri T.N. Gupta, Chairman, Organizing Committee.

* * *

CSIR Vice President Emphasises S&T Cooperation Among the Nations

Shri Shivraj V. Patil, Vice President, CSIR and Minister of State for Science and Technology, was the chief guest at the XIV International Glass Congress, held in New Delhi during 3-7 March 1986. Presented below is the text of his address in which he emphasized the scientific and technical cooperation between India and other nations:

It is indeed a great pleasure for me to be in the midst of the galaxy of glass scientists and technologists who have come from different parts of the world to participate in the XIV International Congress on Glass which is being held



under the aegis of the International Commission on Glass.

Next to ceramics, glass is probably one of the oldest man-made materials, and it will not be an exaggeration to state that a large part of the history of civilization can be traced through the history of glassmaking. Seen as an object of beauty in the ancient and medieval periods, glass has been recorded to go through vast changes not only in the process of manufacture, but also in newer and exciting fields of application in modern times. Further challenging tasks are ahead of us, and no country working in isolation will be in a position to harness and exploit benefits that can be derived from this potential material, hence a necessity of sharing our knowledge at the international level.

For developing countries like ours, engaged in the stupendous task of transforming traditional societies into modern ones, importance of cooperation needs hardly be emphasized. International agencies and organisations have a major role to play in promoting this cooperation and thus to accelerate the process of bringing the fruits of science and technology to the benefits of every man on earth. The International Commission on Glass during 53 years of its chequered existence has been active in stimulating international cooperation for exchange of information, experience, ideas and knowledge relating to glass.

Scientific and technical collaboration and cooperation with other nations, both developed and developing, has also been one of the major planks of India's Scientific Policy Resolution and a guiding principle of the Council of Scientific & Industrial Research. Accordingly, the Council has established exchange programmes with the national agencies of various countries as well as

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ON COVER: Electronic process control unit at a sugar factory

with international bodies for exchange of scientists and scientific information, collaboration on research and development projects of mutual interests and participation in conferences, seminars, etc. Thus the holding of this Congress in our country has not only been in tune with the objective of the Council but also has provided our scientists with the rare opportunity to derive benefits by way of intimate interaction with world luminaries of glass science during their stay here.

Another distinctive feature of this Congress is the post-Congress Training Course intended for the technical managers of the glass manufacturing units of the developing countries who will be exposed to the vast experience and expertise of a faculty comprising men of excellence in this field.

The Congress, therefore, is of great importance for developing countries in general and for India in particular, who have embarked upon the plan of modernization of the society through modernization of the industry and undertaken research programmes on the frontier areas of glass technology, like optical communication fibres, high power laser glass and sol-gel glass.

I wish the Congress all success and would remain eager to know how the deliberations have helped in furthering international cooperations in these fields.

Dr S. Kumar, Director, Central Glass & Ceramic Research Institute, and President, XIV International Glass Congress, welcomed the delegates to the congress. His address:

His Excellency Giani Zail Singh, President of India, Shri Shivraj Patil, Minister for Science & Technology and Vice President, CSIR; Dr William R. Prindle, President, International Commission on Glass; Dr Otto Stehl, Outgoing President of the International Congress on Glass; Shri B.L. Kheruka, Chairman, Reception Committee; delegates to the Congress; Ladies and

Gentlemen, I accord warm welcome to you all to the XIV International Glass Congress, being held under the aegis of the International Commission on Glass. At the outset I convey my sincere thanks to the International Commission on Glass for bestowing on me the unique honour of the Presidentship of the XIV International Congress on Glass. It will be my endeavour to reach the high standard set by Dr Stehl and my other predecessors. The International Commission made a departure from the



conventional practice by selecting a developing country like India to host the Congress and on behalf of the National Organising Committee and also all the delegates from my country, I take this opportunity to record our appreciation and sincere thanks for the confidence reposed. The august presence of His Excellency Giani Zail Singh has added a unique distinction to this historic occasion. Our Chief Guest Hon'ble Shri Shivraj V. Patil, Minister for Science & Technology and Vice President, Council of Scientific & Industrial Research, is the head of our CSIR family. His presence here is a testimony to the constant support and encouragement that we have been deriving from him. We cordially welcome the revered guests.

The delegates who have come from all quarters of the world have lent a truly international character to this Congress. To them and to our Indian delegates and our guests I convey our feeling of

deep satisfaction in having them with us and extend hearty welcome.

We are meeting under the somber shadow of the death of Prof. V. Gottardi. Prof. Gottardi was very much looking forward to be here on this occasion as the President of the Commission and it is sad that we had to lose him on Sept 2 last year. I would request the Session to observe one minute's silence as a mark of homage to the departed soul. It is in the fitness of things that the Society of Glass Technology, UK, has decided to award posthumously Honorary Fellowship to this distinguished scientist.

The last few decades witnessed phenomenal advancement in the various fields of science and technology and these also had a profound influence on the art, science and technology of glass making. New vistas are opening up in applications of glass. Technology of production of conventional glass and glassware also underwent significant changes with the application of micro-processors and robotics. Some of these and various other topics would comprise the scientific and technical contents of the Congress. The Congress provides a unique opportunity to our Indian glass community to project their efforts and achievements and identify the gaps in relation to our own developmental programmes. The deliberations and interactions among the participants will lead to an enrichment of our knowledge bank.

For the first time a post-congress Training Programme has been arranged with the support and cooperation of the International Commission for the technical managers of the glass industry which will help them to update their knowledge and augment competence in their profession.

I hope that the Congress will devote itself to the furtherance of the spirit of cooperation and collaboration in science and technology among the different countries in this small planet of ours.

* * *

IDRC Institutes Yelavarthy Nayudamma Memorial Fellowship

The International Development Research Centre (IDRC), Ottawa, Canada, has instituted for five years a Fellowship in memory of Dr Y. Nayudamma, who was a member on the Board of Governors of IDRC at the time of his death in the tragic 'Kanishka' air crash on 23 June 1985 [CSIR News, 35 (1985), 89].

At a solemn commemorative function organized at the Central Leather Research Institute, Madras, on 13 March 1986, the Board of Governors of IDRC assembled and paid tributes to "an extraordinary individual who died on duty for IDRC and was the principal stimulator in the opening in this country of the Regional Office located in New Delhi". The meeting was presided over by Prof. M.G.K. Menon and attended by over one hundred invited guests including Shri C. Subramaniam, former Union Minister. The Governor of Tamil Nadu, Shri S.L. Khurana, was the Chief Guest.

In his welcome address, the CLRI Director Dr. G. Thyagarajan remarked that Nayudamma was one of the few non-controversial scientists who did so much in so many areas in such a short time. Quoting from Planning Commission Member Shri Abid Hussain's article

in the book *Reminiscences*, he said Nayudamma was a warm hearted person, a man of charm, humility and probity, the likes of him are not easy to find. Like another distinguished scientist, the late Homi Bhabha, Nayudamma was destined to disappear from the great heights into beyond. CLRI, he said, felt greatly honoured to host this function attended by the IDRC governors and distinguished invitees.

The IDRC President Dr. Ivan L. Head, observed that Nayudamma was among the few persons who had left testimonials of immense living value in a number of countries and the Parliament of Canada recorded a moving tribute in the House of Commons in Ottawa following his tragic demise. He recalled his long association with Nayudamma and the many contributions he made in IDRC.

Expressing appreciation for the broad perspective that Nayudamma brought to deliberations of the IDRC Board, the IDRC Chairman Dr. Janet M. Wardlaw stated that the IDRC wished to pay a modest tribute, one that would reflect Dr. Nayudamma's perspective. She announced the institution of Yelavarthy Nayudamma Memorial Fellowship ten

able at CLRI. The Fellowship, awarded to an individual of any nationality at a doctoral level. The Fellowship valued at \$10,000 (Canadian) per year is open to a national of any country and available for research in leather science, leather technology or a subject related to the efficient use of animal byproducts. The Fellowship will take effect from 1 September 1986, and will be awarded to five persons in consecutive years.

Shri Khurana in his address referred to the international stature of Nayudamma. Nayudamma's work at CLRI, Madras, the Governor said, was a splendid saga of total dedication, brilliant conceptualization and remarkable innovativeness. He referred to the several organizations and associations promoted by Nayudamma for advancing the cause of the leather industry and leather workers and said that Nayudamma set about assiduously converting the die-hards in the leather industry. One of Nayudamma's outstanding contributions was the establishment of close linkages between laboratories and the industry so much so his name became almost synonymous with the leather industry. It is indeed rare to see in a person the high qualities of a scientist and the urge of a social reformer. Shri Khurana remarked and expressed his appreciation to IDRC for instituting the Nayudamma Fellowship.

Prof. Menon in his concluding remarks said that it was indeed most appropriate that the meeting was held in CLRI which personified Nayudamma. If one were to identify the greatest single piece of pure research done in this country since Independence, it was done in Madras—the discovery of the triple helical structure of collagen, the prime material which holds the bodies together and the prime material of concern at CLRI. CLRI, Prof. Menon said, is a focal point of many aspects and many activities that science and technology in the country should stand for. He emphasized that science must be related to society and that was why Nayudamma worked in the field of science for the development of



The IDRC President Dr. Ivan L. Head introducing the IDRC governors, seated from left are Prof. M.G.K. Menon, Shri S.L. Khurana, Dr. Janet M. Wardlaw and Dr. G. Thyagarajan.

society. Quoting Albert Einstein, "never in the midst of all your preoccupations with equations and technical matters forget that the central point of your efforts should be man" that was Nayudamma's basic philosophy, Prof. Menon concluded.

CLRI invites applications for the fellowship

Applications are invited for the award of Yelavarthy Nayudamma Memorial Fellowship tenable for one year commencing 1 September 1986 at CLRI. Valued at approximately \$ 10,000 (Canadian) this fellowship is open to a national of any country and available for research in leather science, leather technology or a subject related to the

efficient use of animal byproducts. Candidates must be 30 years of age or younger on 10 September 1986 and possess a doctorate degree from a recognized university in a relevant subject. A travel grant and an allowance towards living cost for spouse will also be provided.

Applications on plain paper supported by curriculum vitae, three letters of reference and a brief statement (about 500 words) of the proposed research work should reach the Director, CLRI, Adyar, Madras 600020, not later than 15 June 1986. The letters 'YNMF' may be superscribed on the envelope. Information concerning facilities and R&D activities at CLRI are available on request. □

Panometer — A Novel AC Resistivity Measuring Equipment for Pan Boiling

Another critical process in sugar production is the crystallization process. One requires to monitor continuously the degree of supersaturation of the mother liquor to assess the various critical stages in the pan boiling, viz. seeding, hardening, thinning, and final pan dropping, and to control the boiling of the strike by regulating the feed of syrup and water. The panometer developed by CEERI monitors the a.c. resistivity of the boiling sugar massecuites in the pan which is related to the degree of supersaturation of the mother liquor. Reduction in the total boiling period by 25%, saving in the total water consumption by more than 30% and development of uniform size and conglomeration of free crystals are some of the significant advantages obtained with the introduction of panometer at the C-grain and C-masseccuite boiling strikes at the pan floor.

Automatic 24-Point Temperature-Data Acquisition & Monitoring System

Measurement of temperature is essential in most of the processes since it is primarily related to energy consumption. Temperature is, therefore, an important variable which needs continuous measurement, monitoring and control. Overheating results in loss of sugar by inversion and in the case of underheating the process remains incomplete. Similarly, exit of flue gases at higher temperature causes loss in energy in the boiler house. There are more than 65 temperature points in the sugar industry which are to be accurately monitored. Electronic system developed by CEERI is a sophisticated industrially reliable and drift-free digital temperature indicating and monitoring system which consists of the following: 4 ½ digital system grade industrial temperature indicator, low thermal precision scanner-multiplexer, multipoint digital display and monitoring panel, control-status

Modernization of Sugar Industry Through Application of Electronic Systems : CEERI's Contributions

Out of the 180 million tonnes of sugarcane produced in the country, only about 34% is used for making direct consumption white sugar. There is thus considerable scope for improvement and modernization of this industry. An initial survey of Indian sugar industry and subsequent discussions with sugar manufacturers and technologists, Sugar Directorate, Ministry of Agriculture and Irrigation, and National Sugar Institute, indicated an urgent need for introducing electronic instrumentation and control systems in the sugar industry for improving the production efficiency, quality and recovery. Accordingly, the work relating to the development of electronic process control instrumentation for juice clarification and pan boiling stages in sugar industry was taken up at the Central Electronics Engineering Research Institute (CEERI), Pilani, under an R&D scheme financially supported by the Department of Electronics, Government of India, during the first quarter of 1978. Simultaneously, the development of a 24-point precision

temperature data acquisition and monitoring system was taken up under the regular programme of the institute.

Automatic Liming and pH Control System for Juice Clarification

Juice purification is one of the critical process stages, which governs the quality of sugar and also affects productivity indirectly. This operation can be properly controlled by measuring and controlling the pH of the juice through automatic control of the reagents such as milk of lime. Automatic lime proportioning and pH control unit developed at CEERI continuously senses the pH of the treated juice and controls automatically the rate of flow of milk of lime so as to keep the pH close to an optimum set value for good clarification of juice. Such an accurate control of pH value also leads to improvement in settling rate and relative reduction in CaO content of treated juice. This also helps in reducing losses due to inversion and indirectly helps in reducing the number of cleaning operations.



Microprocessor-based automatic pH control system for sugar industry

and deviation indicator, industrial hooter and printer. The system is capable of acquiring, indicating and monitoring the temperature of 24 important process points in a sugar factory, with an accuracy of 1°C and resolution of 0.1°C throughout the range $0^{\circ}\text{--}1260^{\circ}\text{C}$. With the system the total energy requirement of a sugar factory could be reduced up to 2% and the processing is also improved.

Technical know-how on (1) automatic liming and pH control system and (2) Panometer was transferred to Satwik Electric Controls, Nasik (Maharashtra) and the Central Electronics Ltd, Sahibabad (U.P.), for commercialization. Also, the institute trained the engineers of these two firms which have successfully commercialized the technology.

So far, 45 sugar factories have installed the equipment at a cost of Rs 32 lakh; economic benefit of each factory is estimated to be Rs 380 lakh/season.

These developments and their successful commercialization have built up confidence and credibility in indigenous technology, and have demonstrated at the same time how electronics can play a major role in improving the

process efficiency and control in the sugar industry.

Recently, the Electronic Component Industries Association of India has considered this work to be an outstanding R&D development and has announced ELCINA-1985 award for it.

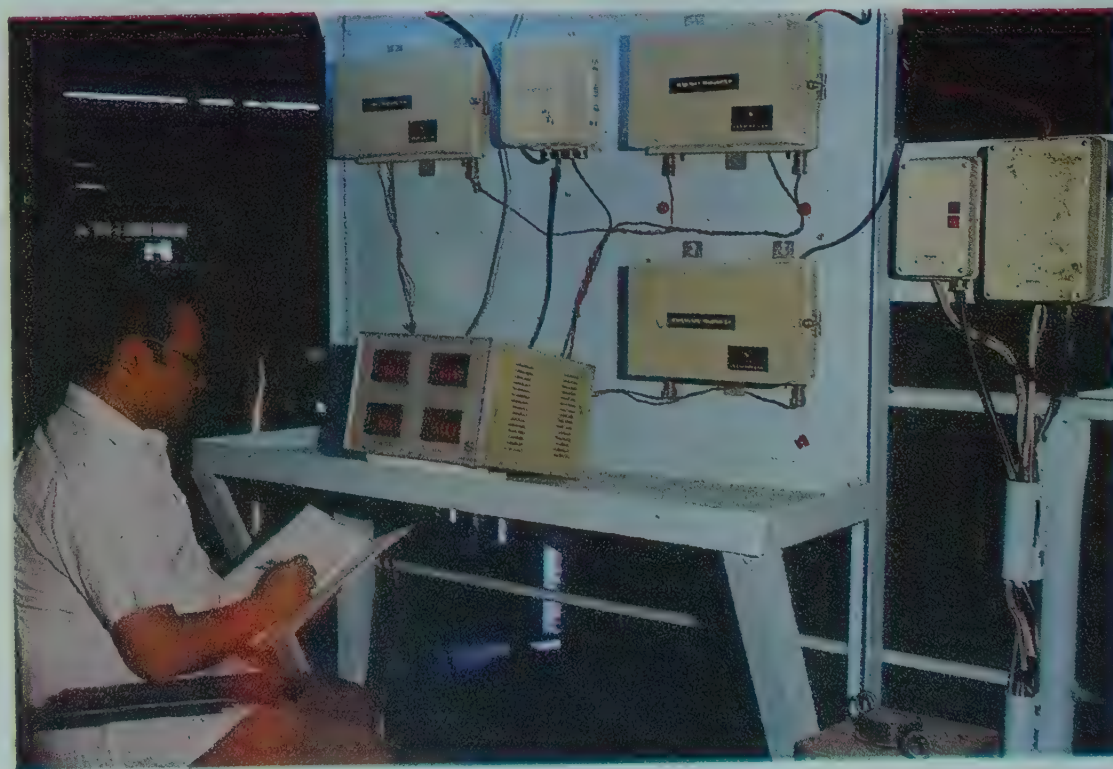
Earlier FICCI had also appreciated the CEERI work in the year 1979.

Microprocessor-based Systems

In the second phase, CEERI continued its R&D efforts with a view to introducing the rapidly emerging technology of microprocessor-based systems. Some of the systems have been fully developed and some are in an advanced stage of development as indicated below:

MAPCON

CEERI has developed a microprocessor based automatic pH control system (MAPCON). The system has been developed with the necessary software as well as hardware and has the following facilities: preliming control and indication of pH, shock liming control and indication of pH, SO_2 control and indication of final pH. This is a fairly advanced and complex closed loop control system using three PID control loops for juice clarification stage which leads to many quantifiable advantages such as: minimum rise in CaO content, increased recovery due to rise in purity, less scaling in evaporation, improve-



Process control and monitoring system in actual use at the Kisan Sahakari Chini Mills, Anoopshahr

ment in clarifier capacity, higher settling rate, and resultant reduction in the cleaning operation due to better removal of scaling compounds.

This system has been successfully field tested in commercial sugar factory in U.P. for two consecutive seasons. After user acceptance of the system, the Department of Electronics and CEERI jointly identified three parties on select criteria basis for commercialization of the technology: Satwik Electric Controls, Nasik (Maharashtra); Scientific Instruments Co. Ltd, Allahabad (U.P.); and Simbhaoli Sugar Mills, Simbhaoli (U.P.). These firms have established regular production of this item. The equipment will be commissioned in the coming crushing seasons in sugar mills.

MIPMOS

Another system called Microprocessor based Monitoring System (MIPMOS) for pan boiling stage has been developed and field tested. Four different process variables, viz. a.c. resistivity, viscosity, temperature and level of the massecuites are measured 'on-line' and displayed on a panel. The system is likely to lead to many quantifiable advantages in pan boiling, e.g. fuel economy, formation of uniform size of crystals in minimum amount of time, reduction in consumption of movement water and higher productivity.

MTDAMC

CEERI's work related to measurement and indication of temperature at various points using a data acquisition system, digital temperature indicator, status indicator and print out has been extended to a microprocessor-based (Microprocessor-based Temperature Data Acquisition Measurement and Control —MTDAMC) system which can monitor more than 60 points and give control signals. This is based on a 16-bit microprocessor INTEL 8086. It offers the following specific advantages: saving of hardware, flexibility in setting the limits, possibility of trend analysis through display, steam economy, and check-on losses. In association with industry, CEERI is planning

to take up boiler instrumentation if fluidized boiler using bagasse is made available by industry for experimentation.

As a back up to the R&D efforts in the area of Microprocessor-based Systems CEERI has set up a Microprocessor-based Systems Laboratory for hardware and software developments and integrations. The laboratory is equipped with the facilities of series II and series III microprocessor development systems, logic state analyzers, EPROM programming facility, etc. A complete hardware and software integration support for INTEL 8085, 8086 and MOTOROLA 68,000 microprocessors is available with high level language support for BASICS, PASCAL, PL/M and FORTRAN. This gives a great flexibility to the user to select appropriate hardware and software configurations appropriately suitable for any specific applications. Microprocessor Laboratory also supports graphic development work station, microprocessor trouble shooting tools Network Resource Manager, Real Time Operating System Packages and desk top computers.

In view of the continued interest of users and constant encouragement from

sugar technologists and also the substantial support from the Department of Electronics for modernization of sugar industry through introduction of electronic systems, CEERI has embarked upon an R&D programme relevant to the needs of the industry. A package project proposal has recently been approved in principle by DoE to design and develop systems for the following critical process stages, with emphasis on mathematical modelling and computer simulation based on some basic physical and chemical processes which need to be analyzed in detail: (1) Juice evaporation stage, (2) Sugar crystallization process in vacuum pans, (3) Control system for sulphur burner, (4) Oxygen sensors and transducers for boiler instrumentation, (5) Colour video display systems, (6) Data highway for microprocessor-based distributed digital process system, and (7) Integrated automatic control system for industrial boilers using fluidized bed combustion technique.

CEERI has organized several seminars/workshops/training courses related to the modernization of sugar industry for the benefit of the industry. □

Photochemistry of Coordination Compounds Using LASER Flash Photolysis and Photoelectrochemistry of Chemically Modified Electrodes

Bhatnagar Prize-winner Prof. Natarajan's Work

The research work carried out by Prof. Natarajan and coworkers has thrown light on various aspects of excited state chemistry of metal complexes: (i) medium effect on the excited state reactivity, (ii) photosensitization processes leading to electron transfer and energy transfer pathways, (iii) electron transfer processes of excited states, (iv) photopolymerization by new metal

complex initiators, (v) applications of the metal complexes in the chemical conversion of solar energy and (vi) use of Marcus theory for explaining photo-induced electron transfer reactions.

Prof. Natarajan has carried out systematic investigations on the photosensitization of superoxo complexes of cobalt (III) by excited state of tris (bipyridyl) ruthenium (II) ion using flash photolysis technique. The excited state transfers electron to the superoxo bridge primarily and in the minor pathway excitation energy is transferred

Prof. P. Natarajan, Department of Inorganic Chemistry, University of Madras, has been awarded the 1984 Shanti Swarup Bhatnagar Prize in chemical sciences (along with Prof. K.J. Rao, Indian Institute of Science, Bangalore) [CSIR News, 36 (1986), 29].

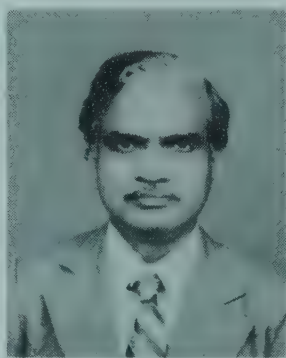
to the cobalt (III) centre to produce cobalt (II).

Prof. Natarajan has pursued the problem further to determine the nature of electron transfer reactions of dioxygen complexes using organic free radicals and unstable metal ions. This work indicates the scope for using conventional reducing agents, excited state redox systems and high energy reducing agents such as free radical and unstable metal ions for the study of electron transfer reactions. This study proposes a model for the superoxide dismutase reaction and a new type of photogalvanic cell. In this connection Prof. Natarajan has used Marcus theory to predict the rate of excited state electron transfer processes. Dinuclear chromium (III) complexes with μ -hydroxobridge on excitation by visible light produce a cyclic reaction.

Prof. Natarajan recognized the importance of chemical conversion of solar energy in India in 1975 and under a UGC-SRC project, investigated the photogalvanic cell involving iron and thionine dye for solar energy conversion. The use of macromolecular dyes for solar energy conversion is more recent and worldwide, there were hardly twenty papers on this subject in 1975. Prof. Natarajan has shown for the first time that when macromolecular dyes are coated on to an electrode and irradiated, the characteristics of the electrode reaction change completely and high current density is observed even with film thickness of 10μ . Normally, polymer films of 10μ thickness have very high resistance and charge migration is practically nil through such films. The first report about this cell, published in *Nature* (1981), shows much potential for solar energy conversion using chemically-modified electrodes. This work was presented at the International Solar Energy Conference held in Brighton, UK, in 1981 and an extension of this work was presented by Prof. Natarajan at the XI International Photochemistry Conference, Maryland, USA, in 1983 as

one of the papers in the First Plenary session.

Investigations initiated by Prof. Natarajan on the excited state chemistry of cobalt (III) complexes in the last five years have shown that the medium has



direct effect on the excited state reactivity. Studies using mixed solvents and pure nonaqueous solvents have shown that water molecules around the excited states are primarily responsible for the charge-transfer breakdown of cobalt (III) complexes. In a recent paper Prof. Natarajan has shown that in the cobalt (III) complexes with macromolecular ligand which coils around the cobalt (III) complex to exclude water, the quantum yield for charge-transfer breakdown decreases by almost 70%. This has large implications in biological photoreactions where macromolecular structure controls the hydrophobic nature of the environment. Again Prof. Natarajan was first to show that copper (II) amino acid complexes induce the photopolymerization of vinyl monomers. He identified the photoinitiating species of the Cu (II) complex using flash photolysis techniques. He is among the initiators of flash photolysis in India in 1976 and recently established a computerized laser flash system.

Born on 17 September 1940 in Somanampatti, Tamil Nadu, Prof. Natarajan had his undergraduate education from the St. Joseph's College, Tiruchi, University of Madras and M.Sc. from the Banaras Hindu University. He obtained his Ph.D. from the University of Southern

California, USA. He joined the University of Madras in 1973 and is presently the Convener, School of Chemistry and Chairman, Board of Studies in Chemistry. Prof. Natarajan has been a visiting faculty at the University of Notre Dame in 1979-1980 and has visited many universities and research institutions and delivered lectures in USA, UK and Switzerland. He is on the editorial boards of *Indian Journal of Chemistry* and *Proceedings of Indian Academy of Sciences*. He is a member of the Project Advisory Committee of the Department of Science and Technology, Government of India. He is an elected member of the New York Academy of Sciences and of the Sigma Xi Scientific Society (USA). □

PERSONNEL NEWS

Appointments/Promotions

At the National Metallurgical Laboratory (NML), Jamshedpur, the following have been promoted on assessment as Scientists F with effect from the dates given in parantheses: Shri K.N. Gupta (27 Aug. 1983), Dr N. Dhananjayan (1 Feb. 1985), Dr M.R.K. Rao (12 April 1983), Dr G.N. Rao and Shri M.J. Shahani (both from 12 April 1982) and Shri D.D. Akerkar (12 April 1984).

Brief profiles of Shri Gupta, Dr Dhananjayan and Dr Rao are given below:

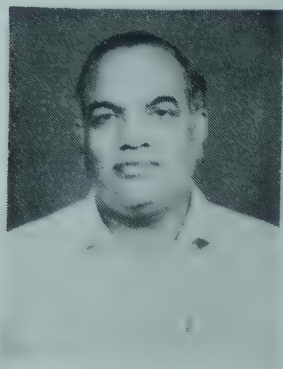
Shri K.N. Gupta

Shri Gupta (born 15 Dec. 1934) did his B.Sc (Met. Engg.) in 1957 and M.Sc (Met. Engg.) in 1958 from the Banaras Hindu University. Prior to joining NML, in July 1962, he served on the staff of the College of Mining and Metallurgy, BHU, where he set up a number of small pilot plants, mainly for education and training of students.

He joined NML as Senior Scientific Officer Grade I, was promoted as Scientist EI in 1972 and Scientist EII in 1979.

Shri Gupta's researches pertain mainly to the iron and steel technology. He has been responsible for developing processes for production of sponge iron in

vertical retort furnace (popularly known as NML's VR-DR process); sponge iron using naphtha and other hydrocarbons as reductants without reforming; iron powder from mill scale and other high grade iron concentrates; magnesium



sulphate hepta hydrate from cyclone dust of magnesite calcination plants; and LiCO_3 from lepidolite, and for single cell extraction of Zn and MnO_2 from zinc concentrates and manganese ores, and reduction of manganese ores for preparation of electrolyte for electro-deposition of Mn metal and manganese dioxide. He has completed several SAIL-CSIR collaborative projects. Also, he has been responsible for developing tests and for physico-chemical evaluation of ironmaking raw materials, mostly sponsored by iron and steel plants of SAIL and TISCO, government and semi-government organizations, etc. He has handled several shop floor problems particularly in iron and steelmaking.

For his work on sponge iron and manganese ores, he received, in 1974, the National Metallurgists' Day award.

Shri Gupta visited USA in 1976 under the NSF scheme of exchange of scientists. He visited Norway, Sweden, FRG and UK twice under the Indo-Norwegian aid programme. He developed a process for the production of high temperature, high reduction potential gases from non-coking coal in a molten metal reactor under the Indo-Norwegian collaborative programme.

Shri Gupta has to his credit 55 research papers, 65 sponsored investigation reports and 3 patents.

He has been associated with the professional bodies like ISI, IIM, IIME, AIME (USA) and is an RAC member of the Sponge Iron India Ltd, Kothagudem, Andhra Pradesh.

Dr N. Dhananjayan

Dr Dhananjayan (born 25 June 1929) received his Ph.D. degree from the University of Madras. He has been with NML since 1949 and his research career has been in the field of chemical, hydro, and electrometallurgy. His major S&T contribution is on the production of electrolytic manganese metal and its dioxide. The 1000 tonnes per annum EMD plant at Trivandrum, Kerala and the EMD pilot plant at the Central



Research Station, Rangoon, Burma, are based on the indigenous technology developed by him and his co-workers at NML. His other contributions are related to the recovery of non-ferrous metals from complex concentrates, utilization of metallic wastes, electrodeposited composite material, tin-free steel, etc. He has advanced a new mechanism on the deposition of manganese in α and γ modifications in presence and absence of certain addition agents, which marks a definite advancement of contemporary scientific knowledge on the subject.

He was deputed to FRG during 1967-68 for participation in the International Seminar on Physical Chemistry and Chemical Engineering held at Karlsruhe

University, and post-doctoral work in electrochemistry. He visited Romania in 1975 on a technical exchange programme to acquaint himself with the latest techniques in hydro-metallurgical practices at the Institute Politehnic, Bucharest.

He was awarded the Binani Gold Medal by the Indian Institute of Metals in 1971. He has to his credit about 55 research papers, a monograph on *Structure of Electrodeposited Manganese* and seven patents on various processes. His work has been quoted in text-books, encyclopaedias and various scientific journals.

The International Battery Material Association (IBA), Cleveland, Ohio, USA, offered him Research Membership of IBA for his contributions on battery active manganese dioxide. This position is offered only to renowned university professors who receive grants from IBA. He is presently the Head of Chemical Metallurgy Division at NML, Jamshedpur.

Dr M.R.K. Rao

Dr Rao (born 1926 at Nandivelugu, Guntur District) had education at Andhra and Banaras Hindu universities. After a brief spell as a Lecturer at Gauhati University, he joined NML in 1951. He was deputed to Canada under the Colombo Plan scheme for one year



during 1955-1956. As an Exchange Fellow under the NSF Programme during 1975, Dr Rao visited different R&D establishments and universities in USA. He worked as a UNIDO Expert on

Refractories in Mexico in 1983. He has also visited research establishments in FRG.

A recipient of the Metallurgists' Day Award (1971) for contribution in refractories, Dr Rao is heading NML's Refractories Division since 1975. He has to his credit over 120 published research papers and reports, five patents and three processes. Dr Rao's contribution in the field of phase equilibria in oxide systems is widely recognized in India and abroad. He has been responsible for transferring the technology on graphite crucibles, submerged arc welding fluxes, clay graphite stopper heads and refractory cements.

Dr Rao is the Chairman of the Local Chapter of the Indian Ceramic Society and Fellow of the Indian Institute of Ceramics and has been very actively engaged in organizing seminars, symposia, get-togethers and refresher courses under the joint auspices of NML and the Indian Ceramic Society.

PATENTS FILED

781/DEL/85: Process for the removal of impurities from sea salt and sub-soil brine salt by floatation technique, N.N. Udwadia, K.J. Langalia and G.D. Bhat—Central Salt & Marine Chemicals Research Institute, Bhavnagar.

782/DEL/85: Improvement in or relating to process to coat low carbon and low alloy steel with aluminium diffuse zones, P. Peri, A. Mukherjee and T.L. Sharma—National Metallurgical Laboratory, Jamshedpur.

851/DEL/85: An improved alkaline primary battery cell, K.B.S. Gapani, V.B. Ramachandran, V.S. Kapali, S.V. Iyer, M.G. Potdar and K.S. Rajagopalan—Central Electrochemical Research Institute, Karaikudi.

915/DEL/85: A process for production of electrolytic and activated manganese dioxide simultaneously from natural manganese ores, D. Nayar, P.L. Sengupta, S.C. Aush and P.K. Sinha—National Metallurgical Laboratory, Jamshedpur.

SENIOR POSITIONS AVAILABLE

DIRECTOR: NEERI

CSIR Advertisement No. 4/86

The Council proposes to appoint a director for the National Environmental Engineering Research Institute, Nagpur.

The work of the institute is organized in the following groups: air monitoring and analysis, air pollution control, industrial air emission, water chemistry, water engineering, analytical techniques development, water hazardous wastes, wastewater agriculture, solid wastes, ecology and ecosystem, epidemiology, environmental microbiology, instrumentation, environmental systems analysis, computer applications and training & environmental engineering consultancy. The institute has its zonal centres in various states in the country and is a WHO collaborating centre for South East Asia in the field of air-pollution and community water supply and sanitation.

Job Requirements: The director is expected to provide high level leadership in the identification, formulation and implementation of R&D programmes and projects at national level and of national importance in the above areas. He will be expected to establish rapport with academic and professional institutions and government agencies dealing with various developmental aspects for ensuring multi-agency cooperation for fulfilment of the objectives for which the institute has been set up. He will have the overall responsibility for the working of the institute within the framework of the CSIR system and for creating an atmosphere conducive to creative work.

Qualifications & Experience: High academic qualifications in public health engineering/environmental engineering or related areas with proven record of excellence in R&D work in the above fields and capability in R&D management.

Salary/Conditions of Service: The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances as per central government rules. Higher initial pay can be considered. Consultancy subject to an upper limit of Rs 15,000 per annum is permissible. Free medical aid and leave travel concession are also permissible for the family as per central government rules. Residential accommodation will be provided on payment of usual rent. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed.

Age: Preferably below 50 years.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee for discussion. The decision of the Council in this behalf will be final. Applications from employees working in government departments, public sector organisations and government funded research agencies will be considered only if forwarded through proper channel with a clear certificate that the

applicant will be relieved within three months of receipt of the appointment orders.

Those interested may kindly send in their curriculum vitae in duplicate in the form obtainable from the Joint Secretary (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001 on or before 30 June 1986. Literature about NEERI will be available on request from the National Environmental Engineering Research Institute, Nehru Marg, Nagpur 440020.

DIRECTOR: NPL

CSIR Advertisement No. 7/86

The Council proposes to appoint a director for the National Physical Laboratory, New Delhi.

The current major areas of research and development of the laboratory are: (1) Primary standards and national calibration programme; (2) Materials development and characterization; (3) Radio and space service; (4) Cryogenics; (5) Physics-based applied projects.

NPL has the responsibility of realizing the 'units' of physical measurements under the International System; Establishment, custody and maintenance of the 'National Standards' of measurements representing these units and to serve as the apex body to coordinate the national calibration programme of the Government of India. The materials development and characterization group has research programmes over a wide range of materials including electronic materials, high pressure physics and technology, superconducting materials, carbon fibres, etc. and the laboratory has a wide range of modern characterization facilities. Radio and Space Science activities currently relate to the Indian Middle Atmosphere Programme, ionospheric and trans-ionospheric communication systems, atmospheric chemistry and space research using balloon, rocket and satellite scientific payload. The cryogenics group has extensive facilities on cryogenics systems and has activities relating to Josephson Volt standard, Quantum Hall Effect, superconducting materials and super conductivity. In addition, the laboratory has a wide range of applied activities including display devices, electrostatic and electrophotography, solar energy utilization, etc.

The laboratory is well equipped with infrastructure such as library and other ancillary facilities. It has a staff of about 1500 of which 400 are qualified scientists/technologists.

Job Requirements: The director is expected to provide high level leadership in the identification, formulation and implementation of R&D programmes and projects of national importance in the above areas. He will establish rapport with academic and professional institutions and government agencies dealing with various related research and development aspects ensuring multi-agency co-operation whenever necessary for fulfilment of the

objectives for which the laboratory has been set up. He will have the overall responsibility for the working of the laboratory within the framework of the CSIR system and for creating an atmosphere conducive for creative work.

Qualifications: High academic qualifications in physics or applied physics or in any of the above fields with proven record of excellence in research and development in any of the areas of work of the laboratory. He should have high managerial capabilities.

Salary/Conditions of Service: The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances as per central government rules. Higher initial pay can also be considered. Consultancy subject to an upper limit of Rs 15,000 per annum is permissible. Residential accommodation may be provided on payment of usual rent. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed.

Age: Preferably below 50 years relaxable in deserving cases.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this behalf will be final. Applications from employees working in government departments, public sector organizations and government funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within three months of receipt of the appointment orders.

Those interested may kindly send in their curriculum vitae in duplicate in the standard proforma obtainable from the Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001, on or before 30 June 1986. Literature about the laboratory will be available on request from the office of the Director, National Physical Laboratory, Hillside Road, New Delhi.

* * *

The Council proposes to appoint four Scientists F, two in the National Metallurgical Laboratory (NML), Jamshedpur and one each in the Regional Research Laboratory (RRL), Trivandrum, and the Central Fuel Research Institute (CFRI), Dhanbad.

CSIR Advertisement No. 3/86: Scientist F for RRL-Trivandrum

It is proposed to appoint one Scientist F in the RRL, Trivandrum to head the Materials Group (Metallurgy & Ceramics). The laboratory is devoted to development of technologies related to the resources of region with special emphasis on: (i) Food spices and related products and (ii) Metallurgy and ceramics — materials. The main fields of R&D in the Materials Group are: (i) Special alloys and composites, (ii) Extractive metallurgy of beach sand minerals including rare earths, and (iii) Clay and fine ceramics. There are at present 65 scientists in the laboratory and the

number is expected to grow to over 100 in the next few years. Essential facilities for the above areas of R&D are available.

Job Requirements: The selected scientist will be expected to initiate plan and guide research in the above areas and allied disciplines of the materials group. He will be expected to liaise with public sector industrial development agencies of the state and central governments and assist the director in the management of the laboratory.

Qualifications: High academic qualifications (first class master's degree) with doctorate degree in the above or allied fields and should have an established reputation in the respective field and a minimum of 10 years of proven record of research work and creative ability of high quality in the areas of material sciences mentioned above.

CSIR Advertisement No. 5/86: Two Scientists F for NML-Jamshedpur

It is proposed to appoint two Scientists F for the NML, Jamshedpur.

Post No. I.

Job Requirements: To plan and guide research in the area of computer application in metallurgical engineering with particular reference to the problem areas such as heat and mass transfer, simulation, optimization, process modelling, fracture mechanics, deformation behaviour, computer aided manufacture and other allied disciplines. Should have capabilities of formulating, executing and supervising R&D projects in these and other areas related to metallurgical engineering.

Qualifications: High academic qualifications with first class master's degree or doctorate degree in engineering, should have an established reputation in the field and 10 years of proven record of research work and creative ability in the area of computer application in the solution of problems related to metallurgical/materials engineering.

Post No. II

Job Requirements: To plan and guide research in any one or more areas of process metallurgy/composites/metal forming/mechanical behaviour/corrosion. Should have capabilities of formulating, executing and supervising R&D projects in these and other areas related to metallurgical engineering.

Qualifications: High academic qualifications with first class master's degree or doctorate degree in metallurgical/materials engineering/science. Should have an established reputation in the field and 10 years of proven record of research work and creative ability in any or more of the above areas.

CSIR Advertisement No. 6/86: Scientist F for CFRI, Dhanbad

It is proposed to appoint a Scientist F for CFRI, Dhanbad.

Job Requirements: The incumbent will be required to plan, formulate, coordinate and guide the R&D activities and provide high level leadership to a team of experienced scientists in the area of coal combustion for development of new technologies and improvement of existing ones.

The candidate will also be required to organize and lead in-plant studies on fuel, furnace and boiler problems of industries. Besides this, the candidate will be required to assist the director in scientific, technical and administrative matters, as and when necessary.

Qualifications & Experience: High academic qualifications with first class master's degree in chemical engineering/mechanical engineering and about 10 years R&D experience in combustion of coal and other solid fuels with special reference to fluid bed and pulverized coal combustion systems, supported by adequate number of patents, publications and design jobs and should have good leadership qualities. The candidate should also have adequate experience in tackling industrial problems of coal combustion for generation of heat, steam and power and specialized experience and knowledge in one or more of the areas: (i) Design and operation of pressurized system, heat transfer equipment; (ii) Mathematical modelling of combustion systems; (iii) Reaction engineering; (iv) Computer programming and interpretation of results derived therefrom. Experience on combustion of liquid and gaseous fuels and the combustion system will be of additional advantage.

Salary/Conditions of Service (common to all the four posts):

The scale of pay attached to these posts is Rs 2000-125/2-2500 plus allowances as admissible under central government rules. These are contractual appointments initially for a period of six years. The contract is extendable and the incumbent can also be confirmed. Consultancy subject to an upper limit of Rs 15,000 per annum is permissible. Free medical aid and leave travel concession are also permissible for the family as per government rules. Residential accommodation will be provided on payment of usual rent subject to availability.

Age: Preferably below 50 years, relaxable in deserving cases.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this behalf will be final. Applications from employees working in government departments/public sector organizations and government funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within three months of receipt of the appointment orders.

Those interested may kindly send in their curriculum vitae in duplicate in the standard proforma obtainable from the Joint Secretary (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001, on or before 30 June 1986. Information about any of these laboratories can be obtained from the Director of the respective laboratory. □

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UNIT
6 JUL 1986
C. E. T. H. MYSORE

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Environmental Pollution and Cancer

Dr P.K. Ray, Director, Industrial Toxicology Research Centre, Lucknow, delivered the Prof. S.C. Roy Commemoration Medal Lecture for the year 1986, on 27 March 1986 at the Life Sciences Centre, University of Calcutta. The topic of the lecture was 'Environmental Pollution and Cancer'. The text of the lecture:

It is widely known that cancer may be caused due to a variety of factors, such as, occupational, environmental, congenital or life style. With respect to occupation, government regulations either have banned or grossly decreased the use of certain carcinogenic substances and set definite exposure limits to others. Of many industrial compounds, aromatic amines are often suspected as carcinogens because epidemiological data indicated an association between bladder cancer in humans and occupational exposure to such compounds. Two structurally related aromatic amines: 2,4-diaminotoluene (DAT) and 2,4-diaminoanisole (DAA) are used for the production of polyurethane foams and elastomers or in dyes. They have been shown to be carcinogenic in animals.

Cytostatic alkylating agents, which are often used in cancer chemotherapy may cause cancer in animals and perhaps in humans. The tumor types predominantly are hemangioendotheliomas, leukemias and sarcomas. In the case of cyclophosphamide, urinary bladder carcinomas are found to be induced.

Inorganic hydrazine, $\text{NH}_2\text{-NH}_2$, is an hepatotoxic and carcinogenic environmental contaminant. While there is a large number of environmental agents to which people are exposed in an occupational setting, carcinogenic substances are also entering our system through the food we eat, air we breathe, and water we drink. Many heavy metals have been described to have the ability to cause cancer. Nickel and cobalt salts have been shown to have carcino-

genic potential; several food mycotoxins (such as aflatoxins), pesticides, synthetic hormones and other food additives have been found to be carcinogenic.



Epidemiologic, clinical and animal studies have suggested that a reduction in total calories or the dietary protein reduces the risk of cancer of some types, while an increase in dietary fat is associated with increased risk of breast cancer. A decrease in fibre content in diet has been found to be associated with increased incidences of colon cancer in USA. Low intake of vitamin A increases the risks for lung, urinary bladder and colon cancer in both humans and animals. The synthetic retinoids is an excellent chemopreventive agent. Selenium inhibits breast and esophageal tumors in animal models but this effect has not been shown in human cancer. Zinc and riboflavin deficiency provide risk factors in both humans and animal models. Lipotropes, including methionine, vitamin B₁₂, folate and choline are important in preventing tumors in animals. Deficiency of these agents is suspected to have some significance in areas of the world where liver cancer, malnutrition and infectious diseases co-exist.

Cancer has become one of the leading causes of death today in many parts of the world. According to IARC (International Agency for Researches on Cancer, Lyon, France), one in four to one in five people will develop cancer. Although current knowledge on the causes of cancer is still rudimentary, but to date most of the etiological agents so far recognized to be associated with human cancers are man-made or refined chemicals, physical agents or cultural habits, such as tobacco smoking. Primary prevention of human cancer, therefore, must take into account the probability that most cancers result from a complex interaction between multiple environmental (exogenous) and host (endogenous) factors, and that carcinogenesis is a multistep process.

Among the 734 chemicals or exposures evaluated so far, nine industrial processes and 30 chemicals, group of chemicals or complex mixtures have been found to be causally associated with cancer in humans. For 214 chemicals or complex mixtures, there is sufficient evidence of carcinogenicity to experimental animals; for 127 of these exposures, no epidemiological study was available. IARC suggests that in the absence of adequate data on humans, it is reasonable, for practical purposes, to regard chemicals or exposures for which there is 'sufficient evidence' of carcinogenicity in animals as if they presented a carcinogenic risk to humans.

One of the first support regarding the environmental etiology of cancer came from the observation that scrotum cancer was most prevalent amongst the London chimney sweep workers. Today a number of cancers have been linked with some viral etiology: Burkitt lymphoma and nasopharyngeal cancer with Epstein Barr virus, some hepatoma with hepatitis virus, Kaposi's sarcoma with HTLV-III/LAV, adult T-cell leukemia with retrovirus HTLV-I, human cervical cancer with some papilloma virus.

It is quite possible that various environmental agents help in the expres-

sion of 'oncogene' which otherwise remains repressed. Depression of oncogene by environmental agents could trigger the mechanism of causation of cancer.

Environmental etiology of some cancer is also evident from the existent information that in the western countries cancer of the breast and cervix in females and cancer of the lung and colon in males are most predominant. Among the native Japanese, stomach cancer is most prevalent; however, among the migrant Japanese in the west of USA colon cancer is most prevalent, showing an etiology of environmental factors. In India, oropharyngeal cancer and cancer of the uterine cervix are most prevalent. However, 40% of all cancers among the Goanese are head and neck cancer, while breast cancer is very predominant among the Parsi women.

It has already been discussed above that while environmental factors could stimulate the carcinogenic process, host factors should also facilitate it for ultimate development of cancer and to maintain its autonomous growth. Here malnutrition and immunosuppressive status of the host may serve as predisposing conditions of malignancy. It has been learnt that a number of environmental pollutants can cause a deprivation of the host to some essential nutrients, which may help cancer to develop. Malnutrition causes depressed immune efficiency in host, while various environmental pollutants themselves are immunosuppressive. It has been established in experimental laboratory research that immunosuppressive status helps in the development and maintenance of malignancy. According to Sir McFarlane Burnett, Nobel Laureate, an effective immune surveillance system operates in each individual to protect us from cancer. If this system is weak or depressed, cancer cells can thrive and survive and grow into a full-fledged cancer, when almost nothing can be done to destroy it.

Over the years it has also been learnt that cancer cells themselves induce an

effective immunosuppressive mechanism by inhibiting both humoral and cellular immunity to maintain its uninterrupted growth. We have studied extensively these phenomena and attempted to counter them to revert the immunosuppressive mechanism and stimulate the host immune system so that it could fight back cancer and destroy it. Ray's hypothesis of 'Immunosuppressor control as a modality of cancer treatment' has opened up a new area of cancer research, where a large number of laboratories are involved to study various facets of it.

Simultaneously with this technique an immunomodulation technique was developed in an attempt to decrease the toxicity associated with high dose anti-cancer drug therapy, which provided a new concept and also an area for further exploration in cancer therapeutics research. Large dose cancer therapy normally is not possible because of its toxicity. Even though the drug is effective, it cannot be continued because it may be life-threatening. Our method has shown that large dose drug therapy could become possible by immunomodulation of the host. It is a new concept, both from the point of view of fundamental concept of immunity—which is known to protect the host against biologically harmful agents such as bacteria, fungus, virus, foreign proteins or carbohydrates, etc. The concept that immune system can protect us against chemical toxicants, as well, is emerging from the results published from author's laboratory.

Combining the immunosuppressor control mechanism and high dose anti-cancer drug therapy, an effective cancer management may become possible.

When we look at the primary prevention of cancer, the first thing to do is to remove the suspected agent or avoid exposure to it. It is advisable also to check body's immune competence from time to time during routine health check-ups. One should take a balanced diet containing proteins, less fat, high fibre, minerals and vitamins. □

The National Information Centre for Leather and Allied Industries (NICLAI), located in the Central Leather Research Institute (CLRI), Madras, since its inception in 1977, has been trying to assess the information requirements of the Indian leather industry, and disseminating the information generated all over the world concerning the scientific and technological aspects of the leather and allied industries. The various forms of services rendered by NICLAI are: library and referral services, documentation services, reprographic services, and printing and publication services. With a view to providing to the industry a forum for focusing their actual information requirements, NICLAI organized a one-day seminar on 24 March 1986 at Madras.

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ON COVER: Space grid roof system: SERC-Madras (see p. 83)

The deliberations of the seminar were divided into three sessions. The first session was presided over by Shri T.S. Rajagopalan, Scientist-in-Charge, Indian National Scientific Documentation Centre (INSDOC), New Delhi, and the keynote address was delivered by Prof. G. Bhattacharyya, Head of the Documentation Research and Training Centre (DRTC), Bangalore. Shri Rajagopalan, in his presidential address, stressed the importance of information transfer to the various sectors of the industry, suitably oriented to their actual needs. Dr Bhattacharyya, in his keynote address, identified the importance of users for an information centre, and a need for educating the users of a technical information centre on the methodology and techniques of search for information.

The second session was chaired by Shri S. Parthasarathy, Honorary Director of the Institute of Information Studies. Six papers were presented, each one highlighting the activities of the different divisions, viz. Library, Documentation, Reprography, Printing and Publications, Computer Applications and Technology Transfer.

The third session was the user interaction session and was chaired by Shri Rajagopalan. The initiators were Shri S. Raja, Editor of *The Tanner* on behalf of the industry and Shri T.S.K. Mahadevan, Scientist, on behalf of CLRI. Dr P.S. Santhanam, representing the leather chemical manufacturers, made some practical suggestions for greater interaction with the industry by way of organizing periodical meets of the chemical industry and arranging for practical demonstration of the products at the tanneries and production units of the entrepreneurs. Shri R. Muralidharan, representing the leathergoods industry, stressed the need for need-based information packages and services for fashion goods and market information. Representing the tanners Shri Abraham Mani, a Leather Technologist, stressed the importance of information transfer and suggested that due publicity should



Dr G. Thyagarajan welcoming the delegates of the Seminar on User Studies and User Education, held in Madras. To his right are Shri T.S. Rajagopalan, Scientist-in-Charge, Indsoc; Prof. G. Bhattacharyya, Director, DRTC; and Dr T.S. Ranganathan, Deputy Director, CLRI

be given to the facilities available in NICLAI and the services offered by it to the industry.

Dr G. Thyagarajan, Director, CLRI, summed up the deliberations.

★ ★ ★

NCL—NABARD Programme on Technology Transfer, Biotechnological Evaluation and Clonal Multiplication of Eucalyptus, Bamboo and Salvadora

Shri R.K. Kaul, Deputy Governor, Reserve Bank of India, and Chairman, NABARD, inaugurated an R & D Programme on technology transfer, biotechnological evaluation and clonal multiplication of eucalyptus, bamboo and salvadora at the National Chemical Laboratory (NCL), Pune, on 17 April 1986. This project is sponsored by NABARD and will involve close interaction with state forest development corporations (FDCs) and also private agencies. NCL has been working for some years on its own on the development of tissue culture methods for the clonal propagation of elite varieties of eucalyptus, bamboo and salvadora. Eucalyptus and bamboo find major applications in the paper and pulp industry, and salvadora is used for the

production of lauric and other fatty acids, used by the soap industry. The broad objective is two fold: (1) These tissue culture-developed tree varieties will be used for bringing denuded forest land under green cover, and (2) the trees thus grown will be used as raw materials for making commercially important products. The NCL-NABARD programme will thus render vital assistance to India's social forestry programme and also provide a source of raw materials for the country's industries.

Welcoming Shri Kaul and the other distinguished guests, Dr L.K. Doraiswamy, Director, NCL, said that it was for the first time in NCL that a research programme was being inaugurated. This was necessary in view of

the special nature of the project, whose outcome would bring immense benefit to society. He thanked NABARD for recognizing the research capabilities of NCL and agreeing to sponsor the scheme. Describing the plan of the work, he said that after developing suitable clonal multiplication methods, the elite plants raised by tissue culture would be put to field trials with help from NABARD and state forest development corporations. In the final phase, NCL would actively interact with the sponsor and FDCs in commercializing the technology. This would culminate in the transfer of the technology from the laboratory to the farm.

In his inaugural address, Shri Kaul stressed the principles underlying the funding of project by NABARD. Recognizing the project's far-reaching implications in social forestry and wasteland development, NABARD decided to become a partner in the venture. In less than four years since its inception, NABARD has already sanctioned 29

research projects from its R & D fund in various disciplines. The agency has accepted as its guidelines the goals set up in the Seventh Five Year Plan, which attached great importance to increasing the tree cover from the present 23% of the geographical area to about 33%. Commending the work that has already been done at NCL, he expressed the hope that the collaboration between NCL, FDCs and user industries would be highly fruitful and also help the small and marginal farmer, and farmers in arid regions.

In his introductory remarks, Prof. Joshi, former Vice Chancellor, Mahatma Phule Krishi Vidyapeeth, Rahuri, laid great emphasis on the need in India to conserve disappearing plant species. Felling of trees and converting forest land into arable land lead to irreversible loss of precious genotypes. There was no way of regenerating them once they were lost, since they are of biological origin. The utmost need of the hour was to identify these species and preserve them. This, according to

him, is the biggest service that the scientific community can render to mankind. The motto of workers in the field of life sciences should therefore be 'Bringing the earth back under the green mantle'.

Dr A.F. Mascarenhas, Head of the team working on the project, proposed a vote of thanks. □

Scientific Commission to Study Effects of Bhopal Gas Leakage on Life systems

The Government of India set up a Scientific Commission for Continuing Studies on Effects of Bhopal Gas Leakage on Life Systems on 25 September 1985, under the Chairmanship of Dr C.R. Krishna Murti, Director, Industrial Toxicology Research Centre, Lucknow, to:

- (1) Collect further information, in addition to the observations already made on human, animal and plant life systems, affected by toxic gas leakage at Bhopal;
- (2) Further analyze observations already made and prepare authentic versions of initial effects;
- (3) Collect information on therapy and remedial measures administered in the initial stages and to evaluate the relative effectiveness of different measures with a view to suggesting remedial action;
- (4) Institute and support specific investigations by nominated investigators and groups on human, animal, as also on plant life affected;
- (5) Initiate specific studies on simulation of effects of toxic gas on animal and plant systems and make observations on long term effects and prepare valid mechanisms for such effects;
- (6) Institute long term observations on those affected over a sustained period of two years and for advising on therapeutic and remedial measures and on occupational problems of those affected;
- (7) Study progeny of those affected;
- (8) Make periodic reports to the government on the progress and results of observations and investigations;
- (9) Seek and obtain appropriate assistance and



Shri R.K. Kaul, Deputy Governor, Reserve Bank of India and Chairman, NABARD, Bombay, inaugurating the NABARD-sponsored R & D programme at NCL; seated on his left are: Dr John Barnabas, Head, Biochemical Sciences Division, NCL and Dr L.K. Doraiswamy, Director, NCL

cooperation from scientists and agencies without prejudice to national, social and legal aspects to promote the quality and speed of scientific investigation; (10) Continue studies of environmental aspects such as effect of the leakage of gas on water, air, etc.; and (11) Take such other measures and actions as may be considered necessary to achieve the objectives of establishing scientific basis, and which should be of value in minimizing short and long terms effects of the toxic and related materials in future, to living systems.

The Commission has already held a number of meetings of its own and has interacted with groups of scientists drawn from the disciplines of life sciences, chemical sciences and medical sciences in order to face the environmental, chemical, medical and biological challenges posed by the Bhopal disaster. The Commission is presently engaged in enunciating continuing studies on the toxic effects of the chemicals with a view to unravelling mechanisms and devising preventive, antidotal and therapeutic measures for the long-term effects. The massive programme mounted by ICMR on the human health effects has yielded some valuable leads which need more intensive investigations, using experimental models.

The Commission in this task, can utilize the expertise and services of institutions and scientific groups to whom it may assign specific roles and responsibilities. Scientists interested in the programme are invited to correspond with the Chairman, Scientific Commission for Continuing Studies on Effects of Bhopal Gas Leakage on Life Systems, 228-A, 2nd Floor, Sardar Patel Bhavan, New Delhi 110 001.

* * *

A New Stable Strain of Egyptian Henbane Rich in Tropane Alkaloids Developed at CIMAP

Egyptian Henbane (*Hyoscyamus muticus* L.), a herbaceous plant, is an alternative potential source of tropane group of alkaloids mainly hyoscyamine, hyoscyne and atropine which find diversified uses in modern medicine due to their anticholinergic, antispasmodic and mydriatic properties. *H. muticus* was introduced in India from Egypt during 1977 by the Central Institute of Medicinal and Aromatic Plants, Lucknow, and has been recommended for commercial cultivation as a winter crop in tropical and subtropical regions of the country to meet the national requirement of this valuable group of drugs.

The commercial crop of *H. muticus* raised from seeds represents highly heterogeneous population resulting from out crossing and thus exhibits large variation for various plant characters including alkaloids, which causes greater instability in its alkaloid yield and quality. To overcome this in-

herent problem, a genetically stable tropane alkaloids-rich strain, designated as CIMAP/NP-41, of Egyptian Henbane has been developed at CIMAP. The improved strain CIMAP/NP-41 has the potential to produce 435 q/ha fresh herbage and 32 q/ha dry matter at mid-flowering stage of plant growth over two harvests in a year in comparison to 385 q/ha fresh herbage and 31 q/ha dry matter of the commercial check. Also, CIMAP/NP-41 is significantly superior with 1.14% average crude alkaloid content over the commercial check which possesses only 0.84% average crude alkaloid content. It is expected that with the adoption of CIMAP/NP-41, it would be possible to increase yield of tropane alkaloids per unit area to meet the requirement of the local pharmaceutical industry of this important drug plant during the coming years. □



New improved strain of Egyptian Henbane—CIMAP/NP-41 developed by CIMAP

Computer Software Development at SERC-Madras

The Structural Engineering Research Centre (SERC), Madras, has been engaged in the development of computer software over the last several years. The Centre has developed a number of algorithms and specific problem-oriented computer programs while carrying out analytical investigations as part of research projects. These programs are frequently used in analyzing complex structures such as transmission line and microwave towers, two- and three-dimensional structural frameworks, grids, braced domes, folded plate roofs, cylindrical shells, hyperbolic paraboloids, cooling towers, containment vessels, and antenna backup structures. Numerous state and central government organizations and several public and private sector undertakings are availing the services of the Centre for the analysis and design of these structures. With the recent arrival of micro-computers, on-line systems, and graphic peripherals, SERC has modified and enhanced the capabilities of these programs to suit a variety of computing environments, viz. main-frame, mini, and micro-computers. Although these programs are capable of handling various complex structures, they cannot be directly used. To render them suitable for general use, the programs require modifications and it is necessary to prepare a number of routines, such as pre-processors to facilitate easy handling of input information through interactive environment (where available), post processors to obtain the information in a format easily understood by the user, and user manuals along with bench mark examples. Efforts in this direction are being made in a variety of application areas, in analysis, design, and drafting.

Software Development for Analysis

Computer programs for interactive

analysis of structural systems such as trusses, plane rigid jointed frames, grids, and three-dimensional rigid jointed space frames have been prepared. These facilitate direct user input for problems relating to the different structural systems. In addition, features permitting modifications in member properties, end conditions of members, variety of lateral loadings ranging from concentrated to trapezoidal loadings, different boundary conditions, and possible changes in coordinates of nodes are built-in interactively so that the user is able to study, through query sessions: (1) different designs, (2) different support conditions, and (3) alternative configurations. Similar programs for folded plates and cylindrical shells using finite strip methods are also available. These programs, named INTRAN (Interactive Truss Analysis), INFRAN (Interactive Frame Analysis), INGRID (Interactive Grid Analysis), INSPACE (Interactive Space Frame Analysis), INFOLD (Interactive Folded Plate Analysis), and INCYSHELL (Interactive Cylindrical Shell Analysis), are available both in source and load modules for direct implementation. Programs with limited finite element capabilities for plane stress and plate bending problems are under development.

Software Development for Design

Programs for interactive design of reinforced concrete members such as slabs, beams, columns under uniaxial and biaxial bending, and footings have been prepared. These programs named RC-BEAM (Interactive Design of Reinforced Concrete Beams), RC-SLAB (Interactive Design of Reinforced Concrete Slabs), RC-COLUMN (Interactive Design of Reinforced Concrete Columns), and RC-FOOTING (Interactive Design of Reinforced Concrete Footings) in both load and source versions are available

for direct implementation. These programs will be included modularly in various special purpose applications such as multistoreyed buildings, portal frames, and slab and girder roofing systems.

Software for Special Purpose Applications

Packages for analysis and design of special purpose structures, such as steel lattice towers, three-dimensional trestles, cylindrical shell/folded plate systems on reinforced concrete columns are also being developed with specific engineering inputs which define the entire problem in terms of a few parameters. The program of INTOWER (Interactive Tower Analysis) for lattice steel towers is available in both source and load modules for direct implementation. Similar packages in other types of applications are also under development.

Graphic Capabilities for Analysis and Design

The programs mentioned earlier are suitable for alpha-numeric environments. In addition, programs for interactive graphic analysis and design, plotting of responses, and drafting of structural drawings are also being developed and some of these have already been completed with specific reference to reinforced concrete slabs, beams, and footings. These programs called SLAB-PLOT, BEAM-PLOT, and FOOTING-PLOT are available with specific reference to printer plotters and incremental plotters like Calcomp. These programs, again being modular, can be attached to any of the programs previously mentioned to make them suitable for graphic environments.

Software Development for Microcomputers

With the arrival of 8-bit and 16-bit microprocessors in India, programs catering to this type of environment for the analysis of structures have been developed. These programs permit analysis of truss, frame, and grid systems on microprocessors having 64

Software for Analysis of Stiffened Plates and Shells

Programs for instability analysis of stiffened plates and shells specific for ship structures, cooling towers, and other plate problems are being developed considering the plate and stiffener as independent elements. Features to include static and dynamic load conditions are also being developed.

In addition, specific research projects on dynamic analysis of machine foundations, reinforced and prestressed concrete products, and automated experimental techniques are also part of the activities having software development as one of the components. All the above mentioned developments are being brought out as independent packages with user manuals highlighting their features, price and installation details. In addition, the Centre also takes up specific problems on analysis, design, optimisation, and drafting of structural systems.

VDU terminals

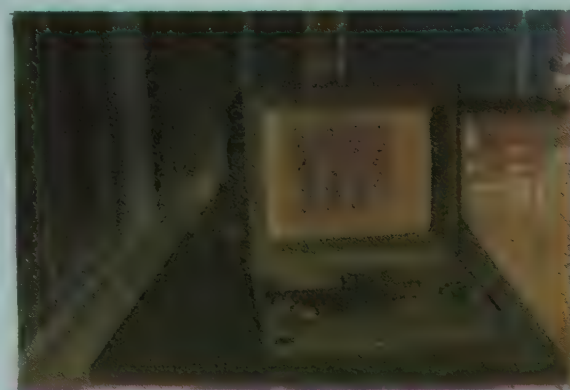
kilo bytes of memory. Consideration of internodal loadings and combination of different loading conditions are the features of these programs. A program called MICSTRAN is available both in source and load modules for implementation in CP/M compatible microprocessors available in the country.

available both in alphanumeric and graphic modes. The interactive graphic routine permits complete information to be displayed on the screen in terms of deformations and bending moments for various stages. These programs named GUYTAN and GUYPLOT are available for direct implementation both in source and load modules.

Nonlinear Analysis of Guyed Towers Software for Offshore Structures

Guyed towers fall into a category of structures which require sophisticated analysis routines. Programs have been prepared which consider the structure as a three-dimensional one, with features for including a variety of nonlinearities and a sophisticated iteration procedure to monitor the response, both in alphanumeric and graphic environments. Using these programs, one can arrive at the response of the structure under normal loading conditions, evaluate the buckling load of the structure and completely monitor the stages in which the buckling has occurred. The inputs to these programs are

Programs for dynamic analysis of offshore skeletal towers considering wave forces, fluid particle kinematics, currents, soil stiffness, mass, and timing effects along with required direction on buried piles, and three-dimensional space frame/truss behaviour with wave incidence in any direction, are under development. Further, quasi-static analysis of offshore structures and on-shore skeletal structures is also being carried out. Specific programs for graphic environments permitting mode shape plotting, digitization of time-history, correlation and spectral density distribution of wave spectra are also under development.



Graphic terminal showing the analysis of guyed towers



80 mb disk drives of Prime 750 computer

High Pressure Studies of Liquid Crystals

Bhatnagar Prize-winner Prof. Shashidhar's Work

Prof. Shashidhar has specialized in the study of phase transitions and critical phenomena in liquid crystals at high pressures. Experiments on liquid crystals under high pressure pose certain problems which are normally not encountered in the study of solid state. Dr Shashidhar has designed and constructed several types of high pressure equipment—200-tonne hydraulic press, optical cell with sapphire windows, diamond anvil cell, etc.—which are specially suited for studies on liquid crystals. Experiments using these

facilities have led to many interesting and excitingly new results which are of fundamental importance.

The first major discovery to evolve out of his work was 'pressure-induced mesomorphism', i.e. the ability to induce mesomorphism by the application of pressure liquid crystalline behaviour in compounds which are not liquid crystals at atmospheric pressure. These results also led to the first observation of 'triple points' in single component liquid crystals. A triple point is defined as the point of intersection of three first order phase boundaries, the three phases coexisting at this point. The experiments of Dr Shashidhar and his colleagues have in fact led to the observation of two types of triple points, viz. the solid-nematic-liquid and the solid-smectic-nematic triple points.

Another important contribution of Dr Shashidhar concerns the tricritical point. A tricritical point is that at which the character of a phase transition changes from first to second under the influence of a field which is not directly coupled to the order parameter. For instance, this field can be concentration while dealing with binary systems or it can be pressure or magnetic field in the case of single component systems. The first observation of a tricritical point in liquid crystal using high pressure technique was made by Delaware group in



USA. However some doubts were expressed at their conclusions which were arrived at using a somewhat indirect experimental technique. Dr Shashidhar's experiments using a more sensitive and direct method clearly confirmed the existence of a tricritical point in the P-T diagrams of several liquid crystals.

Of late there has been considerable interest in multicritical phenomena in liquid crystals. A multicritical point is, by definition, a point in thermodynamic plane (pressure-temperature or temperature-concentration) at which three second order phase boundaries intersect, the three phases being *indistinguishable* at this point. The nematic-smectic A-smectic C or NAC multicritical point was theoretically predicted by Chen and Lubensky and soon observed experimentally by Johnson and his co-workers at the Kent State University,

Prof. R. Shashidhar, Raman Research Institute, Bangalore, has been awarded the 1984 Shanti Swarup Bhatnagar Prize in physical sciences (along with Prof. R. Cowsik, Tata Institute of Fundamental Research, Bombay) [CSIR News, 36 (1986) 29].

Ohio, USA. By high resolution temperature-concentration (T-X) diagrams on four different binary systems, Johnson was able to show that although the global features of the phase diagrams may be different, the topology of the phase diagram in the vicinity of the NAC point should be *universal*. All these experiments of the Kent group were on binary mixtures. The need therefore arose to observe the NAC point in a single component liquid crystal system (which is free of concentration fluctuations) and to test the concept of universality near such a point. The first observation of the NAC point in the P-T plane was made by Shashidhar and his coworkers—B.R. Ratna and S.K. Prasad. They then improved their experimental accuracies to ± 0.1 bar and ± 20 mK and with this improved precision obtained high resolution P-T data close to the NAC point. These data, which perhaps constitute the most precise pressure temperature data on any liquid crystal system to date, clearly showed that *universality rules near the NAC point*. These results are of fundamental significance in condensed matter physics.

The existence of an incommensurate smectic A phase—a fluid phase with two coexisting periodicities—has been predicted theoretically and several groups have been conducting experiments to find this phase. In fact, some doubts were expressed of late whether such a phase can really exist. Very recently, Dr Shashidhar, in collaboration with B.R. Ratna and V.N. Raja, was successful in discovering such a phase in a binary system.

Prof. Shashidhar (born 1 Jan. 1946) obtained his B.Sc. and M.Sc. from the University of Mysore. He did his Ph.D. also at the same University under the guidance of the eminent physicist Professor S. Chandrasekhar. He joined the Raman Research Institute, Bangalore, in 1971, and has been working there since then. He was a Visiting Professor at the Ruhr University, Bochum, FRG during 1980–82. □

Vietnamese Delegation Visits PID

A five-member delegation from Vietnam visited the Publications & Information Directorate, New Delhi, on 7 May 1986. The delegation headed by Dr Nguyen V. Dan, Vice-Minister of Health, comprised Ms Doan Thi Nhu, Director, Mr Le Tung Chau, Deputy Director, Ms Khuong Bang Tuyet, Head of the Planning Section and Mr Nguyen Tuong Dung, Program Officer, Documentation Centre, Institute of Materia Medica. Dr C.K. Atal who is currently on a UN assignment to Vietnam also accompanied the delegation.

The PID Editor-in-Chief Shri S.P. Ambasta apprised the delegation of the current activities of the Directorate in the collection and dissemination of information on science and technology. The delegation evinced considerable interest in the activities of The Wealth of India Division and the Medicinal and Aromatic Plants Information Service of

the Directorate. The possibilities of PID imparting training in technical writing and science editing to some of the Vietnamese personnel were discussed. The delegation also visited the Research and Specimen Cell of the Directorate. □

PUBLICATIONS

Advances in Building Materials and Construction

The Central Building Research Institute, Roorkee, since its inception in 1947, has been engaged in finding solutions to the problems confronting the building industry. Over the years, the institute has developed a large number of economical and efficient building materials and construction techniques. Use of these alternative materials and techniques results in saving of scarce materials like cement and steel, and time and cost of construction. The newly developed materials and techniques have found application in the construction of a large number of low cost houses and other buildings. However,



The Vietnamese delegation with some senior editors of PID; seen at the extreme left is PID's Editor-in-Chief, Shri S.P. Ambasta

engineers, architects, builders and manufacturers of building materials are not fully aware of the recent developments in this field and hence have not been able to take full advantage of the same. To make the coming generation of engineers and architects aware of the new developments, the institute has taken initiative in getting the curricula of undergraduate/diploma students in civil engineering/architecture revised, incorporating the new materials and techniques. This book has been written basically to serve as a supplementary text book for undergraduate/diploma students in engineering/architecture. The book has 12 chapters covering recent developments in (1) Bricks and tiles; (2) Cement, lime, gypsum and concrete; (3) Organic building materials; (4) Polymers and plastics; (5) Foundations; (6) Walls; (7) Doors, windows, lintels and shelves; (8) Damp proofing and water proofing; (9) Floors and roofs; (10) Water supply and drainage; (11) Construction for rural areas; and (12) Building economics and productivity. The techniques and materials have been explained in detail with the help of 214 sketches and photographs. Traditional materials and techniques of construction have not been covered. The information, otherwise scattered in a large number of publications, is presented in a consolidated form in this book. Hence, practising engineers, architects and manufacturers of building materials will find the book to be very useful. Those engaged in research and development on building materials and construction will find the list of references and bibliography given in the book to be of immense help in their work. It will also serve as a reference book for a wide spectrum of people.

The book (authors: Mohan Rai and M.P. Jaisingh, 14×21.5 cm, pp 452, Rs 45) can be had from M/s Dialogue Publications, R-686 New Rajendra Nagar, New Delhi 110 060.

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PERSONNEL NEWS

Dr R. Krishna appointed Director, IIP-Dehra Dun

Dr R. Krishna, Scientist G and Acting Director, Indian Institute of Petroleum, Dehra Dun, has been appointed Director of the institute with effect from 28 April 1986.

Dr Krishna (born 13 Sep. 1946) has had a brilliant academic career, obtaining B.E. (Chem. Engg.) from the Uni-



versity of Bombay in 1968 securing first class with distinction and M.E. (Chem. Engg.) from the University of Salford, UK, within a year. He was appointed Lecturer in Chemical Engineering at the University of Manchester Institute of Science and Technology (UMIST), in 1970. During his six-year tenure at UMIST he supervised a total of 16 masters and doctoral theses in collaboration with the late Professor George Standart. His researches were mainly in the area of multicomponent mass transfer processes of distillation, absorption, condensation and extraction. His own Ph.D. work, carried out independently, culminated in the award of a doctorate degree in 1975.

During 1976-84, he served the Royal Dutch Shell Group of Companies in Holland in various capacities, viz. Design and Development Engineer, Senior Research Engineer and Senior Economist, finally rising to the coveted position of Adviser in Chemical Engineering, with a free hand in research.

During the major part of his stay there Dr Krishna was involved in process development and was particularly responsible for reactor scale-up. As a member of several project teams, he contributed to the development of several processes including: entrained bed coal gasification, synthesis of middle distillates from coal and natural gas, synthesis of gasoline from coal and natural gas, fluidized catalytic cracking, recovery of oil from shale, hydroprocessing of distillates and residues, fluidized coal combustion, hydroformylation for detergent alcohols and pyrometallurgical process for manufacture of magnesium. His published work in the area of multiphase hydrodynamics, along with the earlier work on multicomponent mass transfer, won Dr Krishna the prestigious five-yearly award, *Conrad Premie*, of the Royal Dutch Institution of Engineers (Holland). He is the first non-Dutchman to be so honoured. Also, he is the second chemical engineer to be bestowed this honour, after Prof. W.J. Beek, Chairman, Unilever Research.

Dr. Krishna's reactor design and scale-up procedures are now used widely within the Shell Group, especially for fluidized systems. He is the co-inventor of a novel process for recovery of oil from shale. This process, covered world-wide by three patents, is being developed for eventual commercialization.

During his stay in Holland, Dr Krishna also held a Visiting Professorship at the Delft University of Technology. Dr Krishna joined IIP on 28 June 1984 as Scientist G and Head of the Refining and Training Divisions.

At IIP, besides the usual management duties of divisional heads, Dr Krishna is actively engaged in research in a few selected areas such as aromatics extraction, liquid membrane separations, thermal cracking, fluidized catalytic cracking and rheology of waxy crudes. Due to his efforts, IIP has now state-of-the-art expertise in the design of extraction columns (sieve trays, rotating disc

contactors and packed columns). New insights have been gained in the mechanisms of mass transfer in liquid membrane separations. Dr Krishna has interacted extensively with all the refineries in the area of fluidized catalytic cracking and has suggested strategies for maximizing the yield of middle distillates. Dr Krishna has lectured extensively on FCC to refinery personnel with a view to having the maximization strategies implemented in practice.

Dr Krishna continues his academic teaching interests and is a UGC-sponsored Visiting Fellow at the Department of Chemical Technology, University of Bombay

Dr Krishna has to his credit fifty-odd publications published in international journals. A text book entitled 'Multi-component Mass Transfer', authored by R. Krishna and R. Taylor, is being readied for publication by John Wiley. He is a Chartered Engineer (UK), Member of the Institution of Chemical Engineers (UK), Member of the Indian Institute of Chemical Engineers, and Member of the Society of Rheology, India.

Appointments/Promotions

Dr S.K. Narang

Dr S.K. Narang has been promoted as Scientist EI at the National Metallurgical Laboratory (NML), Jamshedpur, w.e.f. May 1984.

Dr Narang graduated from the Panjab University, Chandigarh, in 1964. After his M.Sc. in 1966 from the Kurukshetra University, he joined D.A.V. College, Jullundur, as Lecturer in Chemistry. In 1967, he joined the Indian Institute of Science, Bangalore and was awarded the Ph.D. degree of the institute in 1974, for his research work under late Prof. T.L. Rama Char, on the electrodeposition of iron alloys. In 1974, he joined the Special Steels Ltd, Bombay, as Senior Research Chemist, where he gained industrial experience of putting new developments in metal

coatings and electrochemical engineering of steel wires into actual production. Since 1977, he has been associated with NML as Scientist in charge of its Electroplating and Metal Finishing Group. Dr Narang is a Life Fellow of the Electrochemical Society of India and is also on the Board of Editors of its journal. He is currently the Vice-President of the Electrochemical Society of India. He is a Life Fellow of SAEST (Society for Advancement of Electrochemical Science and Technology) and Member of the Indian Institute of Metals. He is associated with several technical committees concerning electroplating and metal finishing, including membership of ISI (SMDC 23, SMDC 23/P-22 and CDC 43). He is recipient of the Metal Finishers' Award for the year 1984 for the best paper.

Honours & Awards

Dr S.C. Pakrashi

Dr S.C. Pakrashi, Director, Indian Institute of Chemical Biology, Calcutta, has been elected a member of the newly constituted Governing Body of the Guha Institute of Biochemistry, Calcutta, for a period of three years beginning from January 1986.

Dr R. Kumar

Dr R. Kumar, Scientist (Director), National Metallurgical Laboratory, Jamshedpur, has been awarded a medal by the Central Board of Irrigation & Power, Government of India, for his paper on 'pressure drop in thermal power station'. The medal was presented to him at the annual R & D session of the Board held at Bhubaneswar on 8 May 1986. □

PATENTS FILED

900/DEL/85: A process for the preparation of substituted (1-methyl-2-pyrrolidinylidene)sulfonamides, K.R. Rao, Y.V.D. Nageswar, P.V. Diwan, A.B. Rao, P.B. Sattur, G. Thyagarajan

—Regional Research Laboratory, Hyderabad.

1034/DEL/85: Improvements in or relating to pulse polarograph, A. Poojari and S.R. Rajagopalan—National Aeronautical Laboratory, Bangalore.

1050/DEL/85: An improved method for the preparation of 3-ethyl-8-methyl-1,3,8-triazabicyclo (4,4,0) decan-2-one (centperazine), M.S. Anand, V.K. Agarwal, Ram Partap, S. Sharma, S.K. Chatterjee and N. Anand—Central Drug Research Institute, Lucknow.

1052/DEL/85: A process for the preparation of a novel non-steroidal anti-inflammatory, analgesic, anti-pyretic and transquilosedative drug from *Massa chisia* D. Don. var. *Anquistifolia* Hook F. and T.H. Plantleavers, A.K. Chakravarty, B.J.R. Ghatak, B.D.A. Gomes, R.M. Sharma, & S.C. Pakrashi—Indian Institute of Chemical Biology, Calcutta.

1053/DEL/85: A process for the preparation of novel geranyl based diethers useful as insect control agents, S.A. Patwardhan, R.N. Sharma, A.P. Phadnis, P.D. Gund & I.V. Bhalidar—National Chemical Laboratory, Pune.

1054/DEL/85: A dual fuel injector for gas turbines, B.R. Pai—National Aeronautical Laboratory, Bangalore.

1101/DEL/85: An improved two stroke engine, S. Radzimirski, M. Saxena & R. Kumar—Indian Institute of Petroleum, Dehru Dun. □

1118/DEL/85: Improvements in or relating to a process for the preparation of corrosion/scale inhibitors suitable for prevention of metallic corrosion and scale formation in systems using different grades of waters, I. Singh, & V.A. Altekar—National Metallurgical Laboratory, Jamshedpur. □

CSIR NEWS

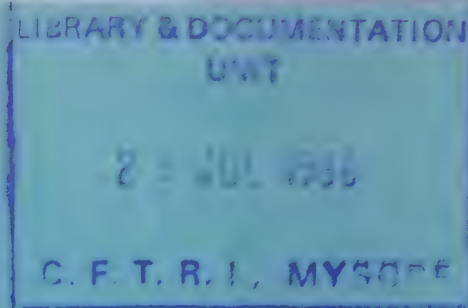


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PM ADDRESSES CSIR DIRECTORS' CONFERENCE

CSIR DIRECTORS' CONFERENCE

A conference of the Directors of national laboratories of CSIR was held at Vigyan Bhawan, New Delhi, on 28–29 May 1986. Shri Rajiv Gandhi, Prime Minister and President, CSIR, presided over the inaugural session which was also attended by Shri Vasant Sathe, Minister for Energy, and Shri K.C. Pant, Minister for Steel and Mines. Shri Shivraj V. Patil, Minister of State for Science & Technology and Vice President, CSIR, delivered the welcome address which was followed by the presentation of highlights of achievements, current major R & D projects and the areas of thrust of the laboratories belonging to the following Coordination Councils: Physical & Earth Sciences (Prof. V.K. Gaur, Director, NGRI), Chemical Sciences (Dr G. Thyagarajan, Director, CLRI), Engineering Sciences (Prof. S.K. Basu, Director, CMERI), and Biological Sciences (Dr Akhtar Husain, Director, CIMAP). The Prime Minister then addressed the gathering.

Prime Minister's Address:

Patilji, Pantji, Dr Mitra, ladies and gentlemen—I thank the scientists for their presentations. It has given us some idea of what the CSIR laboratories have done and are doing. Today CSIR, with 40 laboratories—many of them have celebrated silver jubilees—and over 5000 scientists is one of our premier organizations. I do not think we look at it as an organization just for scientific work; it is really scientific and industrial research. We see it as a very basic tool in our development programme, and if we are going to restructure and reorient our society it can only be possible if we have substantial achievements in areas of frontline technology. If we try to develop—really develop as other countries have done—then science and technology are absolutely essential.

Development or under-development

is to be defined as the lack of being (or not being) able to use modern science and technology for the benefit of our people to increase productivity and improve their lifestyle. If we are going to break this barrier, it must come from our scientific institutions and our scientists and technologists and industrialists.

Preparedness for Future

We have gone through a phase when CSIR has done tremendous work in creating a base for development. Unfortunately or fortunately, the speed at which development is taking place all over the world is much higher and if we are to catch up with the most advanced countries we must go faster than they are going today. Otherwise there is no catching-up. We cannot go faster if we do not think ahead of them. If we are thinking ahead of the next century, the next millenium, we must not think just what is in the minds of other people today but think beyond. Let us be in the frontline. Of course, funds are going to be limited. But there are areas that we can choose and decide that in such and such areas we are going to be in the frontline and India will be the best. Innovation—that is what you must try and do. Not merely trying to see what others have done.

There is this ceramic engine to save fuel. We are really going to do what others have done. Let us not stop our thinking there. The Japanese have already developed it. We should have thought of the ceramic engine before the Japanese had done. That is the type of thinking we have to do—not by imitating what others have done. It can be a part of the exercise; it cannot be the complete or whole exercise. We cannot take up a few thousand projects and pretend we are going to achieve by diluting our efforts. We must decide what we want to concentrate on.

S&T Administration

We can give general political decisions—development of rural areas, food processing, farming, oilseeds, drinking water, certain areas of strategic nature in defence, energy. We will do this to give you direction. From that point on you must take on and see that your efforts are not diffused or diluted. We have to get the right ideas and be quick enough in turning them into usable products for our people and look beyond the industries, beyond the marketplace, to the ultimate user.

You have to redeploy to concentrate and prioritize. Most of all, you will need a very accurate monitoring system to show you what you are doing, whether you are achieving the target or not so that you can take a decision to change the direction, go to a totally new area or cancel the project. This means a much better scientific administration. Scientific administration must be a speciality on its own. It cannot be operated by our general bureaucratic system. If we put our good scientists in charge of administration, we lose our scientists; we do not gain administrators.

Scientific administration is a very specialized task and we have to develop people in this area. We must see how we can develop and produce a cadre of people who would really be a support to our scientists and technologists. It is only when we are able to work in this manner that we will be striving for world leadership in a number of fields. When I talk of our scientists I know they have capabilities; they certainly have brains. We have to get them the infrastructure; and then push them hard enough so that they go ahead.

We have a number of thrust areas and societal missions. We have got certain areas of concentration and better coordination. We hope this will give a new boost to scientific activities and to results that we are aiming to get from these areas.

Priority Areas

The three missions—potable water, oilseeds and wasteland—are very critical for our economy. They must be handled with the utmost priority and efficiency. These missions will require tremendous amount of technical and scientific inputs. When we are looking at areas that will benefit our society, one of the most important aspects is the cost of the final product. If it is going to cost too much, then perhaps it is just not good enough. This will be so for drinking water, oilseeds and wasteland.

Wasteland brings me to environment. You have done work on toxicology. It is still limited. We are today faced with a situation, where our environment is in serious danger of such grave damage that we will not be able to restore it to a satisfactory condition. We have to protect our environment in whatever way we can. This is not a question only for biologists, biological engineering people looking at seeds, trees. It is also the responsibility of the industry to see that the environment is not polluted by production of dangerous chemicals. When introducing a new process or a new product, you must keep in mind any environmental damage resulting from the process or the designs. We have taken the step of passing an Act on criminal liability. The rules will be out soon. This will put some pressure for compliance.

We will need a lot of zeal and vigour and personal involvement from everyone—from the top scientist to the junior-most worker in your laboratory if our missions are to be successful. It will depend on the type of leadership you are giving as administrators or directors of your laboratories. If your leadership is good we will succeed. If something is lacking, we will see missions are floundering and getting caught in their own strings. We should not allow it to happen.

There are projects on fertility control, drugs, vector control, salt iodization; in the physical and earth sciences,

materials, electronics, instrumentation, geophysics, oceanography; then, chemicals, petrochemicals, leather; toxicology, parasitic diseases; in the front-line, molecular biology, mitochondrial DNA. There are some good areas in engineering sciences—mine safety, coal, effluent treatment, aeronautics, slurry transportation, tribology, condition monitoring. But the emphasis must be on the quality of work that we do. It is not adequate to just produce what others have produced. What we are looking for is to produce the best and remove any signs of mediocrity, whether in the laboratory or in what you produce. Mediocrity has a vested interest to see mediocrity is not removed. Most of the people would see that mediocrity remains. It will be our failing if we do not remove mediocrity.

CSIR has done well in providing a base for science and technology right through the country. When we look back, we can see the tremendous contribution that CSIR has made to the country. It is no mean achievement; but it is not enough. Today challenges are much more and unless we reach out well beyond what others are doing we will not be doing justice to our own scientists and people in the country. I know you have it in you to do it. We will love to see that happen.

CSIR Vice President's Address

Respected and Honorable Prime Minister Shri Rajivji Gandhi, Honorable Ministers, Director General, CSIR, Directors of CSIR laboratories, ladies and gentlemen, we have great pleasure and honour to extend a warm welcome to our Prime Minister. We are grateful to him for sparing time to inaugurate this conference.

Yesterday, we paid our homage to the memory of Pandit Jawaharlal Nehru, on the occasion of his 22nd death anniversary. We would like to pay our tributes to his memory today also in this conference.

We cannot think of the freedom struggle, democracy, socialism, secularism, non-alignment, planning, socio-economic development, scientific temper and development of science and technology in India, without remembering him. No one else has done so much for the country as he did for India. Seeds of CSIR were sown when India became free. What CSIR needed, after Independence, was recognition, protection and encouragement. Pandit Jawaharlal Nehru gave them in abundant measure.

In the period of premiership of Mrs Indiraji Gandhi, many scientific departments, organizations and institutions came into existence. The existing ones, grew with leaps and bounds in all directions, covering vast areas of socio-economic activities. She gave them encouragement, strength and inspiration.

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ON COVER: Shri Rajiv Gandhi, Prime Minister and President, CSIR, addressing the CSIR Directors' Conference held in Vigyan Bhawan, New Delhi, on 28–29 May 1986.

CSIR and all other organizations in the field of science and technology shall ever remain grateful to her.

Since Independence, scientists like Dr Homi Bhabha, Dr Sarabhai, Dr Bhatnagar, Dr Krishnan and others worked to give concrete shape to the concepts that were accepted, to build the fine S & T structure, that we have today in the country. We all naturally feel obliged to them all.

What was CSIR expected to do ?

It was expected to create ethos to spread scientific temper in the society, to build S & T manpower, to establish infrastructure necessary for R & D activities, to grasp the advanced and relevant S & T in the world and the country, to develop sciences, technologies and processes, necessary for the socio-economic upliftment of the people to help in unravelling the mysteries of nature, time and space, to contribute towards the fulfilment of the aim of man to achieve higher levels of excellence in all respects.

Have those objectives been achieved

It has created some of the visible ethos for scientific temper, contributed in building S & T manpower, in establishing infrastructure, in understanding and utilizing S & T throughout the world and the country. It has generated some science and technologies which have been useful to us in all walks of life. It has helped us to rise up to higher levels of excellence in certain respects.

Its greatest strength lies in its capacity to cover many areas of S&T activities and to provide ground for synthesis of many disciplines and symbolic existence and development of S&T, which has become very essential and important in the present day scientific world and activities.



Shri Shivraj V. Patil, Minister of State for Science & Technology and Vice President, CSIR, delivering the welcome address

What is expected of it now and for the future ?

It is expected that it should use its existing strength to the maximum possible extent to carry on activities parallel to the outlines provided for all round development in the Five Year Plans, to implement most effectively components of the mission mode activities which were inaugurated in recent times, to be selective and to endeavour to attain the peaks of excellence in areas of relevance to the country, and in the emerging areas of S&T in the world, to tone up its administrative and managerial capabilities, to liaise meaningfully with the users of sciences, technologies and processes, to provide easy mobility to the talents and expertise to and from educational institutions, industries, other areas of productive activities, S&T departments, organizations and institutions and to understand the needs and demands of the present and the future times, the people and their aspirations and the nation as a whole.

How can it be achieved ?

It can be achieved to a very great extent by inspiring all those who are working in it, by having a long term and clear vision of the activities to be done, by being selective, by modernizing its tools, by working hard, by remaining conscious of the fact that its activities matter a great deal to the people and the country.

We hope the experts who are working in it may provide these inputs.

We hope the Review Committee which is appointed to have a look at its activities and to suggest inputs to tone up its managerial and administrative capabilities and to make the S&T activities to achieve its goals, excellence in time and in a cost effective manner, may prove to be greatly helpful.

You have been watching the world from very close quarters. You are guiding the national activities in all fields. You have the opportunities to know what the people want, what the country needs, where the world is moving; you

have the ideas about the shape of things the future has in its store for our country and the world. Your advice and guidance is going to prove immensely valuable.

We look forward to it in this conference and in future too. We would do our best to implement the composite and the comprehensive views that you have about S&T in India and other things to which S&T activities are related.

Proposing a vote of thanks, Dr A.P. Mitra, DG, CSIR, stated that in national laboratories there were certain areas of excellence that had been identified and undergoing regrouping to achieve targets. The kind of heterogeneity available in CSIR was itself its strength. He thanked the President, CSIR, for being with them and assured him that they would endeavour to achieve results, as planned. He was convinced that the scientists CSIR had were some of the best available in the country. He also thanked the Vice-President Shri Patil, Shri Pant and Shri Sathe for attending the conference.

In the afternoon session on the first day, Dr Ram K. Iyengar highlighted the CSIR role in respect of drinking water, increase in production of oilseeds and wasteland development. Prof. M.M. Taqui Khan, Director, CSMCRI, gave data on the desalination plants in operation in the country—in Rajasthan, Gujarat, Tamil Nadu, Andhra Pradesh—based on his laboratory's technology. All these plants were reported to be working satisfactorily. Dr G. Thyagarajan, Director, CLRI; Dr J.N. Baruah, Director, RRL-Jorhat; Dr B. Singh, Director, CMRS; Dr P.K. Jena, Director, RRL-Bhubaneswar and Shri Shivraj V. Patil also participated in the discussion on drinking water.

The following papers were presented: Standards Calibration and Quality Assurance (Dr Kailash Chandra, Acting Director, NPL), Design of Optical Systems (Dr S.R. Gowariker, Director, CSIO), Industrial Electronics (Dr G.N. Acharya, Director, CEERI), Earthquake Hazards Assessment (Prof. V.K. Gaur, Director, NGRI), and Development in Aeronautics (Prof. R.

Narasimha, Director, NAL).

Dr A.P. Mitra observed that the work on aeronautics at NAL was a remarkable achievement and congratulated NAL on the success. In the area of carbon fibres, very good work had been done at NPL too. They could be involved with the work at NAL. Prof. Narasimha explained the NAL-DMRL collaboration in the area of special Al-Li alloys.

The forenoon session of the second day was presided over by Prof. P.K. Jena. Dr T.S.S. Rao (NIO) presented a paper on India's Exclusive Economic Zone, which was followed by a lively discussion on horse-shoe crabs.

Other papers presented in the session were on: Coal Beneficiation (Dr R. Haque, Director, CFRI), Fertility Regulation (Dr V.P. Khamboj), Control of Parasitic Diseases (Dr J. Das), Thrust Areas in Molecular Biology (Dr M.R. Das), Catalytic Engineering (Dr Paul Ratnasamy, NCL), Petroleum Refining Processes (Dr R. Krishna, Director, IIP), Leather Technology (Dr G. Thyagarajan), Toxicology and Industrial Safety (Dr P.K. Ray, Director, ITRC), Base Metals R&D (Prof. S. Banerjee, Director, NML).

The afternoon session was devoted to administrative matters. □



A view of the participants at the CSIR Directors' Conference

Gallium Pilot Plant goes into Production

The pilot plant for the production of gallium, established by Madras Aluminium Company at Mettur based on the Central Electrochemical Research Institute (CECRI), Karaikudi's technology, went into production in April 1986. The intermetallic compounds of gallium with arsenic and antimony find useful application in semiconductor and photovoltaic devices. Super fast computers depend on gallium intermetallics.

Gallium is present in bauxite to the extent of 20–80 g/tonne. In the aluminium industries, bauxite is leached in caustic soda to give the Bayer



A view of the gallium plant at the Madras Aluminium Company Ltd, Mettur Dam

liquor, and when aluminium hydroxide is precipitated out, the remaining solution contains gallium with concentration ranging from 100 to 250 ppm.

CECRI developed a technology for the production of gallium from Bayer liquor from aluminium industries in the country and established a unit of capacity 50 g/day, at CECRI. The metal produced by CECRI was analyzed by the Nuclear Fuel Complex, Hyderabad and found to be acceptable for further purification to electronic grade. With a view to collecting additional data and assessing the feasibility of the technology, the Madras Aluminium Company, jointly with the National Research Development Corporation of India, has put up a pilot plant at Mettur (capacity 100 g/day). The results of test runs were encouraging. The experience in the operation of pilot plant and the data obtained would help in establishing gallium production units at other aluminium companies in India also. The metal has good export potential as well. □

Natural Colourant from Annatto Seeds

The Central Food Technological Research Institute (CFTRI), Mysore, has developed a process to prepare annatto extract in powder form for use as a good colourant. The annatto colour powder is soluble in vegetable oils giving yellow-brownish hue. The powder has been further processed to obtain a water or acid soluble colour in yellow or orange hues.

Annatto extract is one of the oldest known food colourants used in many kinds of foods, mainly in butter, margarine, cheese and related products. Bixin is the pigment responsible for the yellow colour present in the seeds. The quality of the dye is judged by the bixin content of the seeds. Annatto food colour enhances the eye-appeal of foods in a wide variety of applications.

CFTRI has prepared a project report to process one tonne of annatto seeds per day in a batch operation. In India,

annatto seeds are largely available in Orissa, Andhra Pradesh, Madhya Pradesh, Maharashtra and Karnataka.

Superior Clones of Vetiver Developed at CIMAP

Roots of *Vetiveria zizanioides* (Linn.) Nash. contain Khus oil which has wide application in perfumery, cosmetics and chewing tobacco industries. Khus oil, owing to its extremely slow rate of volatility, is considered one of the best fixatives and hence is used to prolong the life of different perfumery and cosmetic preparations. The oil also finds use in traditional medicines as a carminative, stimulant and diaphoretic.

In India, sizeable quantity of the oil is produced annually from wild as well as cultivated sources to meet the demand of perfumery and cosmetic industries. Wild sources account for major supply of roots; only a limited amount is obtained from cultivated sources. However, the fast depletion of wild resources, due to indiscriminate collection, has not only created acute shortage of roots but has also resulted in 2-3 fold increase in cost in the last few years. To ensure regular supply of roots to industries at cheaper rates, Khus cultivation needs to be taken up on large-scale.

Two distinct types of 'Khus' (North Indian Khus and South Indian Khus), differing in oil content and quality, are available in the country. The North Indian type produces best quality oil in the world and fetches 4-5 times more price than the South Indian type. However, the former type yields only 0.2-0.4% oil as compared to 0.7-1.0% in the case of latter.

Initial efforts made in India resulted into development of a number of high yielding hybrid varieties. However, none of these varieties could be taken up for cultivation primarily because of inferior quality of oil.

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Luck-

now, took up a project for evolving high yielding clones with better quality oil. As a result, two clones designated as CIMAP/KS-1 and CIMAP/KS-2 were developed using germplasm collection of the institute. These superior clones were evaluated during 1982-85 along with 21 different collections, including 14 hybrid varieties, to assess their yielding potential and oil quality. CIMAP/KS-1 and CIMAP/KS-2 gave 1.42% and 1.36% oil (moisture-free basis), respectively, against the best cultivar (Pusa Hb-7) with 1.59% oil content. The newly developed clones, viz. CIMAP/KS-1 and CIMAP/KS-2 gave 13.0 and 13.4 kg/ha oil yield, respectively, as compared to 14.9 kg oil/ha in the case of Pusa Hb-7. However, the quality of oil of both the newly developed clones was rated as the best among clones evaluated.

It is expected that with the adoption of these newly developed clones, it would be possible to increase the production of better quality Khus oil at cheaper rate. □

Synthetic Studies in Terpenes

Shri R.H. Naik of the National Chemical Laboratory, Pune, synthesized some optically active acid moieties possessing 1R *trans* configuration.

A new synthetic route was established towards the conversion of (+) 1R *trans* pyrethroids, viz. 2,2-dimethyl-3-(2-phenyl/*p*-substituted phenyl-prop-1-enyl) cyclopropane carboxylates. The compounds prepared exhibited larvicidal as well as adulticidal activities against *Aedes aegypti* predominantly.

Methyl (+) 1R *cis* chrysanthemate and its higher homologue, 1R (+) *cis* homochrysanthemate, were synthesized from the abundantly available (+)3-carene. The new synthetic route gave higher yields of chrysanthemic acid.

Some key intermediates used in the synthesis of substituted chrysanthemic acid analogues from (+)3-carene were synthesized. The 1R *cis* and 1S *cis*

cyclopropane ketoesters are important synthons for the synthesis of the corresponding 1R *cis* and 1R *trans* pyrethroids such as permethrin, cypermethrin, deltamethrin and biophenothrin, and bioresmethrin.

Rearrangement studies were carried out on the α -epoxide prepared from 4- α -acetoxy-car-2-ene on both acidic as well as basic catalysts.

Shri Naik worked under the guidance of Dr G.H. Kulkarni and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

Chemically Reactive Derivatives from Cashewnut Shell Liquid (CNSL) and Cardanol

Suitable chemical modification of the side chain unsaturation of cardanol can lead to the development of newer products of potential industrial value thus enhancing the commercial utilization of cardanol and cashewnut shell liquid (CNSL). Keeping this in view, Shri V. Madhusudhan of the Regional Research Laboratory (RRL), Hyderabad, worked on the development of chemically reactive derivatives from CNSL and cardanol that had not been investigated so far, and studied their utility in various end uses.

Kinetic model and reaction mechanism for the hydrogenation of the complex system of cardanol to 3-pentadecyl phenol (3-PDP) using Raney nickel and Rufert nickel catalysts were suggested for the first time. It was shown that the hydrogenation reaction is a consecutive first order reaction and is irreversible. The relative reaction rate constants and activation energies were determined. Based on the kinetic study of the hydrogenation of CNSL it was concluded that the experimental variables need to be kept at a higher level in this case as compared to the hydrogenation of cardanol.

Two methods were examined to improve the colour stability of cardanol, involving (i) a partial hydrogenation of the unsaturation in the side chain, and (ii) the use of antioxidants. Partial hydrogenation to reduce the triolefinic component was found to have a marked effect in improving the colour stability. A couple of antioxidants were also found to be fairly effective in this regard.

Standard conditions were established for isomerization of the isolated double bonds in the side chain of cardanol/diene/triene completely to the conjugated form. The molar extinction coefficient of the conjugated diene was determined using TLC in conjunction with UV spectroscopy data.

Adducts based on the isomerized cardanol were developed in comparison with those from the unmodified cardanol using the dienophiles maleic anhydride, itaconic acid and methacrylic acid. The products were characterized using IR, NMR and mass spectroscopy data and structures assigned in each case. Adducts were evaluated as water soluble film formers and as polyfunctional components of alkyd resins and showed promise.

Shri Madhusudhan was awarded Ph.D. degree by the Osmania University for his thesis based on these studies. He worked under the guidance of Dr M.A. Sivasamban. □

Biodegradation of Toxic Chemicals Used in Plastics

Plastics and polymers though considered to be inert materials of low biodegradability pose serious health threats due to the leaching of some of their toxic additives. Phthalic acid esters, chiefly used as plasticizers in plastics are now recognized as ubiquitous micropollutants. Studies conducted at the Industrial Toxicology Research Centre (ITRC), Lucknow, have demonstrated that these chemicals exert

toxic effects on liver and testis. Acrylamide, a vinyl monomer and its polymers also pose threat to health when used as water flocculents, soil stabilizers and grouting agents. Earlier studies at ITRC have established the neurotoxic potential of acrylamide. These chemicals are also a potential source of threat to environment and their disposal is a problem. Recently, Shri Rishi Shanker of ITRC attempted the biodegradation of phthalate esters and acrylamide using microorganisms from soils and sediments.

The phthalate esters, viz. di-n-methyl phthalate (DMP), di-n-butyl phthalate (DBP) and di-(2-ethylhexyl) phthalate (DEHP) were found to be degraded in a garden soil under aerobic conditions. The degradation occurred via hydrolysis to phthalic acid. Various bacteria were isolated from soils and a river sediment capable of utilizing one or more phthalate esters as carbon source for growth.

Acrylamide monomer was found to be hydrolyzed in soil to acrylic acid and ammonia very rapidly by soil microflora. The disappearance of acrylic acid was slow while ammonia was partly converted to nitrate by the nitrifying bacteria present in soil. Anaerobic conditions retarded the degradation of the monomer. Two organisms identified as *Pseudomonas sp.* were isolated from two soils by enrichment. The strains degraded acrylamide via hydrolysis to acrylic acid and ammonia which were utilized as carbon and nitrogen source for growth. One of the strain tolerated up to 4000 ppm of acrylamide and was unaffected by high temperature (45°C). Amidase, the enzyme catalyzing the hydrolysis of the monomer, was characterized in one of the strains. The enzyme had substrate specificity of the order: formamide > acrylamide > acetamide, while higher chain amides were unaffected. The enzyme was sensitive to catabolite repression by succinate both in presence and absence of nitrogen source. Another amidase, with substrate specificity of

the order: acrylamide > acetamide > formamide, was present when acetamide was supplied as sole carbon and nitrogen source for growth. This enzyme was inducible by acetamide and was repressed by succinate. The results suggested that acrylamide is detoxified to less toxic metabolites by at least some bacteria present in soil.

These studies provided evidence that

bacteria capable of dissipating these chemicals are present in ecosystems of Indian environment and the bacterial strains isolated may prove useful in biodegradation of toxic chemical waste.

Shri Rishi Shanker was awarded Ph.D. degree by the Kanpur University for these studies, carried out under the supervision of Dr P.K. Seth of ITRC.

* * *

Science and Technology Exhibition for Members of Parliament

A science and technology exhibition reflecting activities and achievements of various science departments was organized for the Members of Parliament during 15 April-9 May 1986 in the Parliament House Annexe, New Delhi. All the science departments of the Government of India participated in this exhibition. CSIR, through its Public Relations Unit planned, designed and coordinated the exhibition which was organized in three major groups: *Group A (15-20 April, 1986)*: (i) Department of Non-conventional Energy Sources,

(ii) Department of Environment & Forest and (iii) Department of Ocean Development; *Group B (23-27 April, 1986)* (i) Council of Scientific & Industrial Research (CSIR), (ii) National Research Development Corporation (NRDC), (iii) Central Electronics Limited (CEL) and (iv) Department of Science and Technology (DST) and *Group C (1-5 May, 1986)* (i) Department of Atomic Energy (DAE), (ii) Department of Space and (iii) Department of Electronics (DoE).

Efforts were made to display items of



Shri Balram Jhakkhar, Speaker, Lok Sabha, at the CIMAP stall

relevance to the multifarious industrial development of the country and improvement in the quality of life of the masses. Apart from the display in the covered space, some live models using solar energy were displayed in the open space attached to the exhibition site. A

number of scientific films, audio visual programmes were also screened during the exhibition.

The exhibition was inaugurated on 15 April by the Minister for Parliamentary Affairs and Civil Supplies, Shri H.K.L. Bhagat. The Group B exhibi-

tion was inaugurated by the then Minister for Steel and Mines (presently Minister for Energy), Shri Vasant Sathe on 23 April.

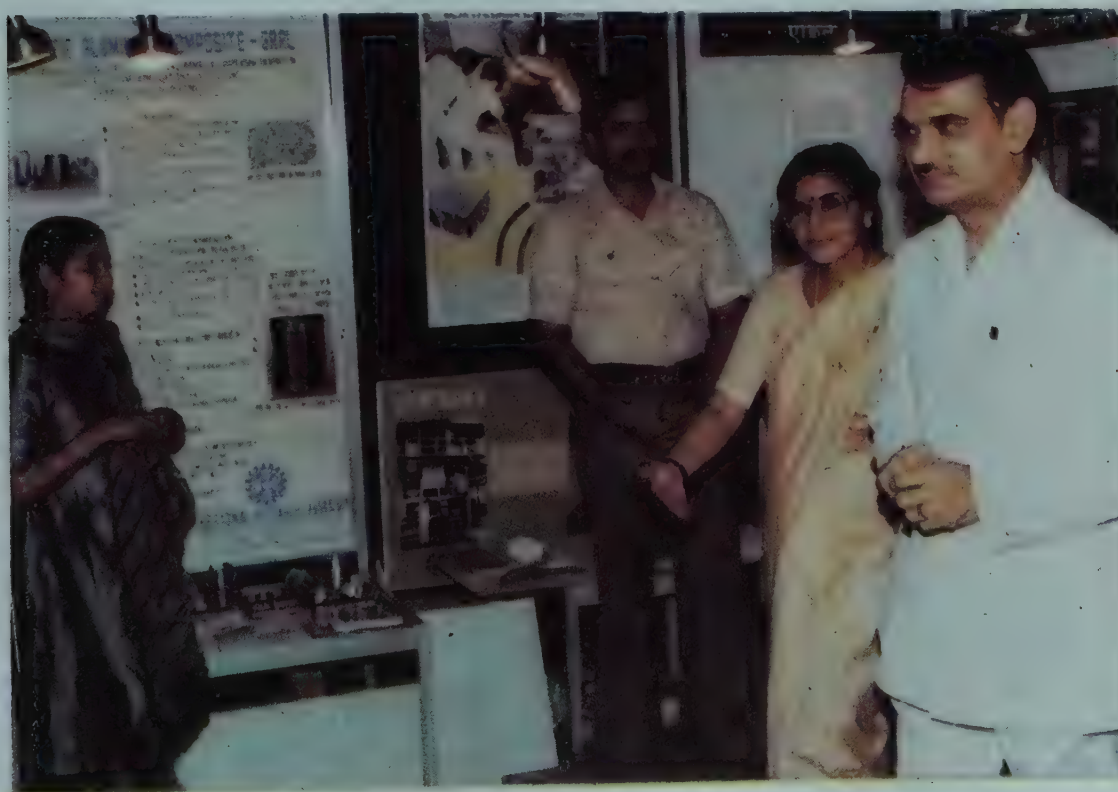
A number of senior Cabinet Ministers, Speaker of the Lok Sabha and eminent Members of Parliament visited the exhibition and showed keen interest in the processes/products developed by different CSIR laboratories and other science departments.

In addition to this, an S&T exhibition, with the participation of CSIR and with focus largely on technologies relevant to rural and semi-urban areas and environment, was organized on 8-9 May 1986 at the Parliament House Annex. Organized on the occasion of National Seminar on Role of Science, Technology and Environment in Development, the exhibition was inaugurated by the Prime Minister Shri Rajiv Gandhi.

Shri Gandhi took keen interest in the exhibits related to low cost housing projects, food products, and the instruments developed by the CSIR constituents. □



Dr R.K. Bhandari, Director, CBRI, showing the low cost housing model to Shri Rajiv Gandhi



Shri Shivraj V. Patil at the RRL-Bhopal stall

Preparation of Basic Titanium Sulphate (Titan)

NRDC Award-Winning Invention

This invention relates to a process for the preparation of a tanning agent incorporating titanium. The main object of the invention is to produce a titanium tanning product which is predominantly cationic in nature, similar to basic chromium sulphate. The starting material is the titania pulp and the salt obtained is water soluble and highly st-

The announcement of the National Research Development Corporation of India's 1986 Republic Day award for a team of four scientists, including three from CLRI, who have developed a new technology for 'preparation of basic titanium sulphate (Titan)' has been made in *CSIR News*, 36 (1986), 13.

able. The leathers obtained are comparable with alum and zirconium tanned leathers. Combinations with lesser amount of chromium on retannage with E.I. produces leathers of the required characteristics for uppers, lining, etc. reducing the pollution load due to chromium considerably.

The main advantages of this process are: 1. A new indigenous technology for leather-making using titanium is envisaged; 2. It gives white leather which is amenable to pastel shades possessing higher hydrothermal stability and strength; 3. It has greater scope to produce variety of leathers in combination with other tanning materials; 4. The titanium tannage is absolutely free from pollution unlike other tanning materials.

Specifications

Solubility in cold water:	freely soluble
Total titanium content (% TiO ₂):	18.64
pH of 1% solution:	1.80
Nature of titanium species	
(a) % cationic:	52
(b) % anionic:	40
(c) % non-ionic:	8

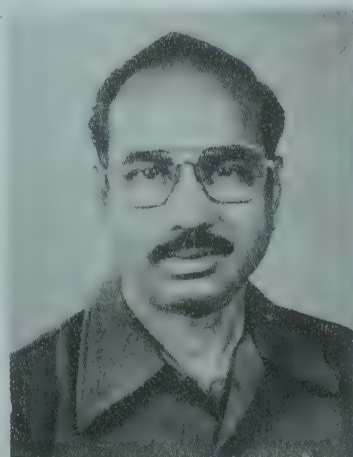
The cost of one kilogram of the tanning salt (19% TiO₂) works out to be Rs 16-18. The Travancore Titanium Products, Trivandrum, which is the supplier of the raw material (titania pulp) is interested to produce the material as an auxiliary product initially.

Brief Profiles of the Inventors

Dr M.P. Swamy

Dr Swamy (born, 1936) obtained his B.Sc. from the University of Madras in 1958. 'Associateship of the Institute of Chemists', Calcutta, by examination in 1978, and Ph.D. from the Patna University in 1983. He was enrolled as a fellow of the Institute of Chemists Calcutta, in 1984. His field of specialization is analytical chemistry related to biochemistry and leather analysis. Currently, he is engaged in the develop-

ment of newer tanning agents with nil or less pollution load. Before joining CLRI in 1966, he served as an Assistant



Biochemist in the Biochemical Laboratory, General Hospital, Pondicherry (1959-65) and then as a Chemist in the T.B. Chemotherapy Centre (ICMR), Madras (1965-66). He has 35 research papers to his credit.

Dr J.B. Rao

Dr Rao (born 1920) obtained his B.Sc. (Hons.) from the Leeds University, UK, in 1956 and then Ph.D. from the Madras University in 1968. His field of specialization is the development of various indigenous tanning materials for the manufacture of different types of



leathers. Prior to joining CLRI in 1952, he served as a Research Chemist in the Chief Inspectorate of Military Explosives, Poona (1942-44), Lecturer in Chemistry, V.R. College, Nellore (1945-46) and Chemist, Institute of

Leather Technology, Madras (1947-52). While at CLRI, Madras, he was deputed as a Technical Officer (Leather) to Khartoum, Sudan (1962-67) and then to Zaria, Nigeria (1968-72), on FAO assignments. After his retirement from CLRI in 1980, he further served the institute as an Emeritus Scientist for four years. He has 54 research papers to his credit.

Shri S. Bangaruswamy

Shri Bangaruswamy (born 1936) obtained his B.Sc. (Chemistry) from the University of Madras in 1956, the Technician Grade Certificate of the City and Guilds of London Institute in Leather Manufacture in 1961, and Diploma in Leather from the Government of France in 1967. His field of specialization is the chemistry and technology of leather manufacture. He joined CLRI in 1959 after putting about two years' of service as a demonstrator in Chemistry, Presidency College, Madras and as a



Chemist in the Cinchona Department, Mettupalayam. While he was at CLRI as the Head of the Technical Services Project, he was deputed to various countries, such as USSR and Nigeria on an FAO assignment. He was actively associated with the work connected with the drafting of I.S. specifications for leather and leather chemicals. He has 75 research papers to his credit.

After putting 25 years of service in CSIR, he opted for voluntary retirement in 1984 and is now working as a

Chief Research Officer, Leather Research Institute of Nigeria, Zaria, Nigeria.

Prof. J.N. Chatterjee

Prof. Chatterjee (Born 1923) obtained his B.Sc. (Hons.) in 1943, M.Sc. in 1945 and D.Sc. in 1949 from the Patna University. His field of research was synthesis of oxygen heterocycles in relation to natural products, condensed pyridines, synthetic dyes, perfumes, etc., and leather chemistry. He was awarded Das-Gupta gold medal of the Indian Chemical Society in 1956, was



elected Fellow of the National Academy of Science in 1967 and of the Indian National Science Academy in 1972, and was awarded H.K. Sen Memorial medal of Institution of Chemists in 1982. He has been associated with many academic bodies, e.g., Member, Council of Indian Chemical Society; Fellow, Royal Institute of Chemists, London; Vice-President, Institution of Chemists etc. He joined the Patna University as a Lecturer in Chemistry in 1949 and became University Professor of Chemistry in 1965. He was also the Director, Indian Lac Research Institute, Numkum (1972-75) and Dean of the Faculty of Science, Patna University (1975-77). After his retirement in 1983, he is at present the Visiting Professor of Magadh and Bhagalpur Universities. He has visited many foreign universities as a Visiting Professor. He has guided

about 48 research students for their Ph.D. degrees and has more than 140 research papers to his credit.

Workshop on Salt-Based Industries

A workshop on Salt-based Industries (magnesium metal and other chemicals) was organized by the Central Electrochemical Research Institute (CECRI), Karaikudi, jointly with the Ramnad District Planning Forum at Valinokkam, Ramnad District, on 19 April 1986 to identify the industries that could be started immediately. After discussions, a few salt-based industries were identified, including one on potassium iodate which is required for the production of iodized salts. In pursuit of the government's policies, CECRI has considerably relaxed the terms and conditions on the transfer of potassium iodate technology. □

TRAINING COURSES

Refresher Course on Storage Battery Technology

An extended course on Storage Battery Technology was conducted during 3-28 March 1986 at the Central Electrochemical Research Institute (CECRI), Karaikudi. Seven candidates from various organizations attended the course which consisted of the four modules: Metallurgical aspect of commercial lead acid battery grids; Materials and components of batteries and their properties; Battery assembly, specifications, quality and process control; and Other batteries.

Refresher Course on Solar Selective Black Coatings

A condensed course on Solar Selective Black Coatings was conducted at CECRI during 31 March-4 April 1986.

Eight candidates from outside organizations attended the course. The course covered the basics of solar energy, solar collectors, basics of selective coatings, methods of coating, testing of coatings and the applications of coatings. □

Computer Aided Analysis of Structures (CAAST)

A five-day intensive course on Computer Aided Analysis of Structures (CAAST) was conducted at the Structural Engineering Research Centre (SERC), Madras, during 3-7 March 1986. The objectives of this course were: (i) to expose practising engineers to the use of on-line computing systems, (ii) to acquaint them with the development of software for structural engineering applications, and (iii) to demonstrate the use of the software developed at SERC.

The course faculty comprised scientists from SERC, Madras. The fourteen lectures that were delivered covered: basics, static analysis, dynamic analysis, nonlinear analysis and computer-aided design.

Twenty-eight participants from all over India representing a good mix of practising engineers, private consultants and senior design engineers from public sector, central and state government undertakings, attended the course. Shri E.U. Rao, Director, Lighthouses and Lightships, Madras, delivered the valedictory address in the concluding session and distributed the certificates to the participants. □

PERSONNEL NEWS

Appointments/Promotions

Dr K.P. Singh

Dr K.P. Singh of the Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, has been promoted as Scientist EI with effect from 24 February 1985.

Dr Singh (born 2 Feb. 1940) did his M.Sc. (Agriculture) from the Agra University and Ph.D. from the Kanpur University. After a brief teaching assignment of one year in Saharanpur he joined the Regional Research Laboratory, Jammu, in 1964.

Dr Singh's significant work has been on the commercial production of rye ergot in India. The annual ergot yields which had never exceeded 100 kg up to 1964, touched 15.5 tonnes in 1977 at CIMAP farms alone, as a result of his distinguished efforts. Thus the country not only became self-sufficient but also started exporting the drug. Also, some pharmaceutical concerns established units to produce ergot drugs indigenously. Dr Singh was able to establish various ergot strains on chemical basis, viz. ergotamine and ergotoxin series. His scientific efforts not only stopped deterioration of commercial strains, which was till then a serious problem, but also led to the continuous improvement of higher active principles. India now has a firm base to produce ergot of international quality.

Dr Singh visited Hungary under a Indo-Hungarian Programme of Science and Technology and studied the advancements in the cultivation of medicinal and aromatic plants at the Hungarian Central Medicinal Plants Research Institute, Budapest, from March to July 1971. He joined the CIMAP Regional Centre, Jammu, in 1974 and soon showed his calibre in farm management by achieving two-fold increase in total production at reduced inputs on 1282 acre semimechanized farm. He moved to CIMAP, Lucknow, on transfer, in 1976. His efforts to screen the sites in U.P. Hills have indicated good scope for ergot, belladonna, pyrethrum and dioscorea cultivation which will generate employment for the local unemployed as well as create a base for phytochemicals in future. Presently, he is engaged in the study of various diseases of medicinal and aromatic plants.

Recently a new species of *Bipolaris* (*B. costina*) has been collected and described by his group. He has about 30 publications to his credit. □

PATENTS FILED

980/DEL/85: A process for the production of 2-aminophenyl aryl methanones from 2-isocyanatobenzyl chloride, B.K. Misra, Y.R. Rao, and S.N. Mahapatra—Regional Research Laboratory, Bhubaneswar.

981/DEL/85: A process for the production of pure silica and oxalic acid from paddy husk, A.N. Sengupta—Central Fuel Research Institute, Dhanbad.

1004/DEL/85: A process for the production of ammonia by photo-catalytic reduction of molecular nitrogen, M.M.T. Khan, R.C. Bhardwaj and (Smt.) C. Bhardwaj—Central Salt & Marine Chemicals Research Institute, Bhavnagar.

1005/DEL/85: A process for the photo-catalytic decomposition of water into hydrogen and oxygen, M.M.T. Khan, R.C. Bhardwaj and (Smt.) C. Bhardwaj—Central Salt & Marine Chemicals Research Institute, Bhavnagar. □

SENIOR POSITIONS AVAILABLE

CSIR Advertisement No. 8/86

SCIENTIST F FOR NCL

It is proposed to appoint one Scientist F for the National Chemical Laboratory, Pune.

The R&D work of the laboratory is carried out in seven research divisions: (1) Biochemistry, (2) Inorganic chemistry, (3) Organic chemistry, (4) Physical chemistry, (5) Polymer chemistry, (6) Chemical engineering and (7) Process development. NCL has modern analytical and testing instrumental facilities such as photoelectron

spectroscopy, Fourier transform NMR spectrometer and X-ray fluorescence spectrometer. The laboratory has a staff of 1150 of which more than 225 are qualified scientists.

Job Requirements: The selected scientist will be expected to plan and guide research in the area of process development in organic intermediates, drugs, pesticides, dyes, etc. and other allied disciplines. He should have capabilities of formulating, executing and supervising R&D projects in these areas.

Qualifications & Experience: First class master's degree with Ph.D. in organic chemistry/organic technology with specialization in process development in organic intermediates, drugs, pesticides, dyes, etc. The incumbent should not only be proficient in process development but also should have evidence of leadership with 10 years experience in conducting high quality research in organic chemistry. This is a senior management position and the incumbent will be required not only to lead a big team in process development but also to guide research in organic synthesis.

Salary/Conditions of Service: The scale of pay attached to this post is Rs 2000-125/2-2500 plus allowances as admissible under the Central government rules. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed. Consultancy subject to an upper limit of Rs 15,000 per annum is permissible. Free medical aid and leave travel concession are also permissible for the family as per government rules. Residential accommodation will be provided on payment of usual licence fee subject to availability.

Age: Preferably below 50 years, relaxable in deserving cases.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee for discussion. The decision of the Council in this behalf will be final. Applications from employees working in government departments, public sector organizations and government funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within three months of receipt of the appointment order.

Those interested may kindly send in their curriculum vitae in duplicate in the form obtainable from the Joint Secretary (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110 001 on or before 14 August 1986. The literature about the laboratory, if required, can be had from the office of the Director, National Chemical Laboratory, Pune 411 008 on request. □

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C. F. T. R. I., MYSO

CSIR NEWS



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Silver Jubilee Celebrations at RRL—Jorhat

The Regional Research Laboratory (RRL), Jorhat, has completed 25 years of its existence. The only major multidisciplinary national laboratory under the aegis of the Council of Scientific & Industrial Research, in the north-eastern region of India, it celebrated its silver jubilee on 30 March 1986. Shri Bhishma Narain Singh, Governor, Assam & Meghalaya, inaugurated the silver jubilee celebrations; Shri Brindabon Goswami, Minister of Science, Technology & Environment, Assam, presided. The inaugural function was attended by eminent scientists from different parts of the country and abroad, and others. As a part of the celebrations, the laboratory also organized an International Seminar on Frontier Areas (ISOFA) in applied chemistry & chemical engineering, during 30 March—5 April.

Inaugurating the function, Shri Bhishma Narain Singh, appreciated the achievements of the Jorhat laboratory over the last twenty-five years. He said that to ensure a self-reliant modern economy, development of science & technology was essential. He urged RRL-Jorhat to popularize S&T so that its benefits could reach the grassroot level soon. To bring about the desired rural development in the north-eastern region with its peculiar situation, the Governor said, it would be necessary to draw up a scientific and technological strategy. This should be based on comprehensive survey of natural resources, their exploitation through technologies appropriate to the level of environment and keeping in view the enlistment of mass participation through a concerted information drive, together with a special programme with the association of scientific and research organizations on the one hand, and various user agencies on the other. This way the scientific and technological inputs could make vital impact on the day to day life of the rural masses.

Shri Shivraj V. Patil, Minister of State for Science & Technology, and Vice President, CSIR, congratulated the Director and RRL staff for their contribution in the field of S&T over the last 25 years. He said S&T is necessary for all round development. The north-eastern region is rich in natural resources and no other state is genetically like this region. He urged that research in S&T should be aimed at increasing mission oriented scientific activity. He further said that the nation had already built an infrastructure for development work in S&T. "Today the position is that we do not have to depend upon other parts of the world for scientific manpower. On the contrary, our scientists and technologists have gone to other parts of the world and are contributing their mites for the development of S&T. In our country, we have more than 160 national labora-

tories, more than 140 universities and more than 900 inhouse R&D units in the industry. So many departments have also been created".

Shri Patil said that though the allocations for scientific research have been raised from Rs 20 crore in the first Five Year Plan to Rs 5000 crore in the Seventh Plan, these were still inadequate. Scarcity of funds has led the government to select certain priority areas and the research laboratories have been told to select their own thrust areas on the basis of the natural resources of their regions. He added that our scientists should now strive for excellence in certain selected areas to keep India abreast with the fast developing technologies in the world.

Shri Patil urged RRL-Jorhat to lay stress on the development of biotechnology which would help the eastern sector in improving agricultural production, animal husbandry, industry, health and hygiene. Adding that all that



Seen at the inauguration of Silver Jubilee Celebrations at RRL-Jorhat are: (from left): Dr J.N. Baruah, Director, RRL-Jorhat; Shri Shivraj V. Patil, Minister of Science & Technology and Vice-President, CSIR; Shri B.N. Singh, Governor, Assam & Meghalaya; Shri Debeswar Sarmah, Ex-MP; Shri Brindabon Goswami, Minister of S&T, Assam; Shri B.P. Chaliha, Deputy Director, RRL-Jorhat

was developed here should be made available to other parts of our country, the minister said that our approach should be very selective, scientific and concentrated. The centre wanted research laboratories to create a scientific temper among the people because scientific activity, rather than capital and management, hastens development, he said.

Shri Patil released the silver jubilee publications and distributed mementoes to the following staff members who had completed 25 years of services in the laboratory, Dr J.N. Baruah, Shri B.P. Chaliha, Dr D.N. Bordoloi, Dr J.N. Hazarika, Shri B.N. Borgohain, Shri T.R. Gopalkrishnan, Shri N.C. Sarmah, Shri G.P. Bora, Shri I.K. Gogoi, Shri D.K. Bhuyan, Shri G.C. Dey, Shri A.C. Sarmah, Shri A.C. Baruah, Shri B. Saikia, Shri N. Saikia, Shri M.P. Kalwar, Shri S.C. Dutta, Shri S. Balmiki, and Shri N. Balmiki. Thirteen RRL-Jorhat staff members—Shri V.S. Shukla, Shri R.K. Mazumdar, Shri M.D. Dutta, Shri S.R. Dutta Choudhury, Shri J.N. Borgohain, Shri A.K. Biswas, Shri A.K. Sarmah, Shri T.N. Pathak, Shri N.C. Das, Shri A. Majumdar, Md.M. Husain, Shri I. Rajkumar, and Md. A. Quadir—who had completed 25 years of service in CSIR, also received token gifts.

In his presidential address, Shri Brindaban Goswami said that Assam is a backward state with abundant natural resources. Exploitation of resources would solve our problems, and this requires study and research. That is where the role of RRL-Jorhat fits in.

International Seminar on Frontier Areas (ISOFA—I)

The one-week International Seminar on Frontier Areas was inaugurated by Shri Bhishma Narain Singh on 30 March. The inaugural function was attended by several renowned national and international scientists, and dignitaries.

While inaugurating ISOFA, Shri

Singh said that none could afford to ignore scientific development in the modern world and at every turn there was an imperative need to seek the aid of science to improve the quality of life of the people. The Governor laid stress on the need of harnessing scientific knowledge to meet the challenge of the future.

Shri Singh said that RRL-Jorhat had worked significantly in developing various important processes and technologies in the field of the chemicals, pesticides, drugs and pharmaceuticals, cements, etc. and by developing these processes the laboratory was directly contributing towards the development of scientific manpower and research potential in the north-eastern region as a whole. The Governor was confident that the exchange of views amongst the participating scientists, both Indian and foreign, would go a long way to contribute towards a better understanding of the problem bearing on the development of science and technology in the north-eastern region.

Shri Lalit Chandra Rajkhowa, Minister, Food and Civil Supplies, Assam, while presiding over the inaugural function, appealed to the scientists for exploration of mineral resources of Assam for their proper utilization towards economic development of the state.

The Union Minister of State for Labour, Shri P.A. Sangma, who was the Chief Guest at the valedictory function, was very happy to know about the 25 years' achievements of RRL-Jorhat. He said, "RRL-Jorhat can play a very important role in channelling the R&D efforts to provide support to the development plan of the region. As a nation we are committed to raise the standard of living of our population. We have increased productivity in all fields. The quantum of product or the service per unit of efforts has to be raised. Drudgery of our labour force has to be reduced in this direction. We have made progress but more is needed to be done to attain such a goal. We have to direct our efforts towards specified

goal oriented programmes. All these efforts could become more effective through the co-ordinated and regular guidance provided from appropriate sectors of science and technology. To meet these demands our scientists should not only be willing to participate in development programmes but should also be capable of generating knowledge, information and technologies of internationally acceptable standard. This is a goal we can, I am sure, achieve". "I am aware that RRL-Jorhat has played such a role; my only suggestion is that more emphasis may be put in this direction. Efforts should be based on advanced technologies and must be the most appropriate", Shri Sangma added.

Dr S.K. Mukherjee, Chairman of the valedictory function, appreciated the RRL's efforts to conduct the seminar on the Frontier Areas in Science and Technology. He said that the seminar provided a common platform for the younger scientists to share the thoughts with veterans of international repute. He added that RRL-Jorhat could chalk out the future plan based on the priorities suggested in the seminar.

Prof. J.S.M. Botterill, Birmingham University, UK, expressed his views about ISOFA—I and praised RRL's ef-

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ON COVER: Regional Research Laboratory, Jorhat

forts which, in his opinion, were comparable to those of any international institute of technology.

Dr K.V. Raghavan, Coordinator-ISOFA—I highlighted the proceedings of the seminar.

Proceedings of ISOFA—I

The seminar was divided into five disciplines, viz. Chemical reaction engineering, Fluid bed combustion of coal, Pulp and paper, Oil field chemicals, and Advanced analytical chemistry.

The scientific presentations in Chemical reaction engineering were covered in three technical sessions with sub-specialization: gas-liquid and gas-solid reaction systems and modelling and simulation of multiphase reaction systems. The session on gas-liquid and reaction systems discussed the recent advances made in selectivity in gas-liquid consecutive reaction system, methanolysis of alkyl nitrile and triethylamine oxidation. Prof. M.M. Sharma, the renowned Indian chemical engineer, chaired the session and delivered the keynote lecture. The session on gas-solid reaction system deliberated the recent advances made in this area. Dr L.K. Doraiswamy, presented the keynote lecture on the recent advances and Dr D.J. Gunn, University College of Swansea, UK, delivered a lecture on heat/mass dispersions in fixed reactors. A research paper was presented on deactivation kinetics for methanol dehydration. It was interesting to note that chemical reaction engineering can play a vital role in plant tissue culture.

The modelling and simulation of multiphase reaction system attracted 5 research presentations on NO_x absorbers, phthalic anhydride reactor, fixed bed reactors, steady state free convection and diffusion and reaction in solid-solid system. A panel discussion on the relevance of modelling of multi-phase reactors for commercial system was organized on 31 March. In this session, chaired by Prof. R. Kumar of the Indian Institute of Science, Bangalore, seven

experts expressed their views on success stories, prerequisites for successful simulation, modes of testing the models and safety simulation. The fluid-bed combustion (FBC) of coal was discussed in two separate technical sessions. FBC design and modelling formed the theme for the first session chaired by Dr R.P. Krishnan of the Oak Ridge National Laboratory, USA. In his keynote lecture, he highlighted the various aspects of FBC modelling supported with practical data on US high sulphur coals. The research papers presented in the session covered distributor design, pressure transients and combustion kinetics. The technical session of FBC technology was chaired by Shri B.K. Mazumdar, a former Director of Central Fuel Research Institute, Dhanbad. The first keynote lecture on technological aspects of FBC design was delivered by Prof. J.S.M. Botterill, University of Birmingham, UK. The second keynote lecture, delivered by Dr Abbi, highlighted the development of FBC in India. Two research papers on experimental studies on high sulphur coals and FBC for agricultural wastes were presented.

The recent advances in pulp and paper technology were discussed in two technical sessions. Dr D.C. Tapader, the well known paper technologist, chaired the first session on speciality and coated papers. A keynote lecture was delivered by Dr N.D. Mishra on R&D needs in this area. Another keynote lecture on Indian pulp and paper industry by Dr S.C. Jain was read by Dr Jivendra. Three research papers were presented in this session. They covered pigment characteristics on paper coating, carbonless copying paper and effect of pinholes on newsprint characteristics. The second technical session on raw material for pulping was chaired by Dr R. Pant. Six research papers were presented. They covered de-structuring of chips, polyacrylamide adsorption on cellulosic fibres, pulping techniques and lime sludge utilization.

The oil field chemicals were discus-

sed in three technical sessions and one panel discussion meeting. Well known scientists from major oil producing companies in India participated in the deliberations. The first session on EOR techniques was chaired by Shri A.K. Sarmah and the keynote lecture was delivered by Dr Inderjit Singh. He highlighted the Indian opportunities and challenges in EOR with vital statistical information. Four research papers covering micellar polymer flooding, petroleum sulphonates, water injection and clay stabilization techniques were presented. The deliberations clearly pointed to the need for intensifying R&D efforts in EOR for application in our country.

The second technical session on oil field chemicals, chaired by Shri C.L. Kaul, deliberated on mud additives, fracturing fluids, organophilic bentonites, etc. These are all important chemicals requiring adequate R&D attention. The participants stressed the need for re-evaluation of the specifications of the critical oil field chemicals. Another important recommendation which emerged from the meeting was related to the completion of the field trials on developed oil field chemicals within a specified time frame.

Crude oil rheology was specifically discussed in the third technical session which was chaired by Shri P. Bais. Six papers were presented in performance rating of flow improvers, rheological investigations and other transportation problems. The need for intensive studies for 'apriori' prediction of crude behaviour in pipe lines was particularly stressed in this session.

The advances in analytical chemistry were covered in a single session chaired by Prof. S.K. Mukherjee. Dr K.G. Doss, an expert on mass spectrometry, delivered the keynote lecture. Six research papers covering computer techniques for molecular display, XRD techniques, quantum mechanics and kinetic and theoretical studies of disproportionation and photo-oxidation reactions were presented in the session.

Five papers from the five disciplines covered by the seminar received awards for best presentation. □

CIMAP Celebrates Its Annual Day

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, celebrated its Annual Day on 21 March 1986. The Annual Day function was presided over by Shri Lokpati Tripathi, Minister for Health and Family Welfare, Government of Uttar Pradesh, who in his presidential address praised the contributions of CIMAP in the development of technologies for cultivation of economically viable medicinal and aromatic plants. He said that chemistry was going to play a vital role in the health care programme of the country. He laid special stress on the utilization of *Artemisia annua*, an anti-malarial plant of Chinese origin which has been introduced by CIMAP. He pointed out that solution to many man-made problems lie in preserving the vegetation.

Prof. S.C. Bhattacharyya, Honorary Visiting Professor, Indian Institute of Technology, Bombay, delivered the

Third Silver Jubilee Lecture entitled, 'Indian Plants—Store House of Chemicals'. Prof. Bhattacharyya said that India possesses all types of climatic conditions from the tropical to the alpine. The country is very rich in its flora and fauna. Plants and plant products have been used in the indigenous system of medicine and perfumery preparations since ancient times. With the development of modern scientific methodologies, we now know more about plant constituents. A preparation based on plants might contain 100 constituents or more. The odorous portion of coffee contains more than 350 constituents which have been identified and characterized. With adequate care and modern techniques, it was possible to isolate and identify most of the constituents present in a plant. This has been further facilitated by the introduction of instrumental techniques for isolation, identification and characterization of the constituents.

Discussing major constituents of some of the important Indian plants, such as Vetiver, Costus, Valerian, Agarwood and others, Prof. Bhattacharyya said that many of these constituents are highly valued for their dis-

tinctive and characteristic odour, others have medicinal properties or could be converted to products having more significant medicinal value. He laid down special emphasis on the examination of Indian plants, particularly those having medicinal and aromatic values. This is a composite exercise, Prof. Bhattacharyya said, in which botanists, chemists, biochemists and experts in genetics should join hands together, the results then would be rewarding. Such a combination of scientists exists in CIMAP which is a very gratifying situation indeed, Prof. Bhattacharyya added.

Earlier at the outset, Dr A. Husain, Director, CIMAP, welcomed the Chief Guest, scientists and other dignitaries present on the occasion. Narrating the major highlights of the year 1985–86, Dr Husain said that the institute continued to develop high-yielding strains and carry out their commercial exploitation on the farmers' field by way of its extension activities. A spectacular example was that of Japanese mint, menthol-rich strain-CIMAP/MAS-I, developed earlier which had almost replaced the traditional strain under cultivation. Another such strain designated as CIMAP/Hybrid-77 was released to the farmers during the year. The new strain of spearmint-CIMAP/MAS-5 and Scotch spearmint CIMAP/MCAS-2 were also released to a limited number of farmers for cultivation. Other contributions which need special mention were development of improved strain of aromatic grasses, release of high yielding strain of opium poppy—*Shyama* and *Shweta* to the farmers, establishment of rose oil extraction unit in Kashmir valley, tissue-culture of citronella, *Duboisia*, *Hyoscyamus* and patchouli plants and large scale cultivation of antimalarial drug plant, *Artemisia annua* for production of artemisinin for its clinical and toxicity trials. He further said that in a project funded by the Department of Environment, Government of India, Tissue Culture Discipline of the institute had already developed quick micropropagation tech-



Shri Lokpati Tripathi presenting the superior variety of Scotch spearmint to Shri V.P. Rastogi of Badaun. Also seen in the picture are Professor S.C. Bhattacharyya and Dr Akhtar Husain

nique for *Valeriana wallichii* and other rare plants.

Describing the development of new techniques during the year, Dr Husain said that a new method of distillation called hydrodiffusion technique had been developed which produces essential oils of superior perfumery value. The method would be upscaled during the current year, he added.

Dr Husain disclosed that as a result of byproduct of R&D activities, CIMAP produced essential oils and medicinal plants worth more than 10.50 lakh of rupees. The institute received an amount of more than Rs 0.40 lakh as premium on sale of superior varieties. A total production of medicinal plants and essential oils worth 23 crore of rupees was achieved as a result of technology transfer by the institute in the country.

The institute also continued its collaboration with the international agencies like FAO, UNIDO and WHO. Training was imparted to several fellows drawn from Guinea, Thailand, Bangladesh, Nepal and Nicaragua during the year.

On this occasion, Shri Lokpati Tripathi released a superior variety of Scotch spearmint (CIMAP/MCAS-2) and presented it to Shri V.P. Rastogi, a progressive farmer of Badaun. □

Regional Seminar on Handling and Dissemination of Oceanographic Information

A five-day Regional Seminar on Handling and Dissemination of Oceanographic Information and Data was held at the National Institute of Oceanography (NIO), Goa, during 17-21 March 1986. The seminar was supported by Unesco and IOC, Paris. It was aimed at providing up-to-date knowledge of information management methods in oceanography to the users in the region, and promoting exchange of information.

Twenty-four scientists from India and abroad participated in the seminar which included resource persons from Unesco, UK, Philippines, Netherlands and India. The participants were drawn from Trinidad, Sri Lanka and different organizations within India. They discussed and presented papers on various aspects of data and information dissemination and exchanged views on problems of mutual scientific interest. Practical demonstrations were given on micro- and macro-computers for storage and retrieval of data, and bibliographic and other information.

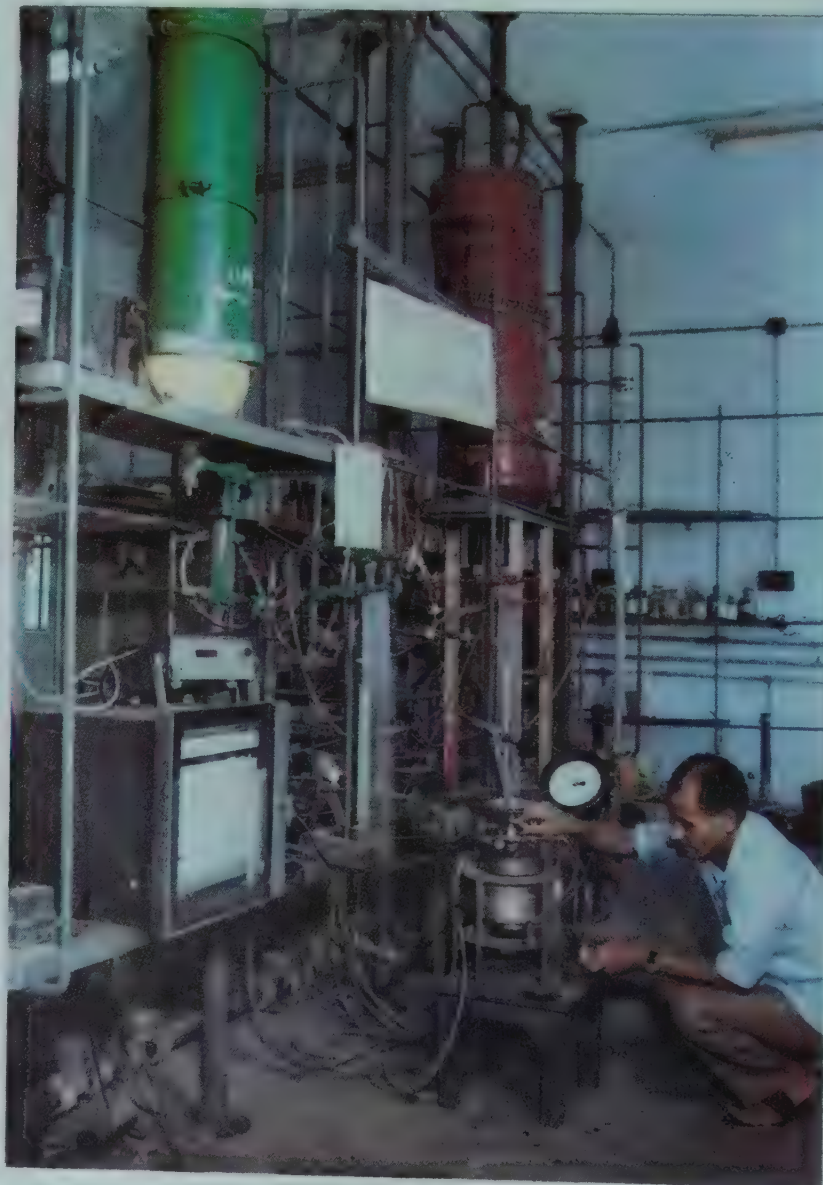
While inaugurating the seminar, Dr H.N. Siddiquie, Director, NIO, said that the dissemination of data and information had assumed great importance in the development of the research and much significance was being attached to proper formatting, storage and dis-

semination of data and information, including literature search through the computers.

Dr A.P. Mitra, Director General, CSIR, also addressed the participants. The seminar recommended that various member countries of IOC in the South-East Asia should co-operate in exchanging the methodologies, data and information among themselves. □

IIP-FICOM Agreement for Production of Sulpholane

An agreement was signed between the Indian Institute of Petroleum (IIP), Dehra Dun, and FICOM Organics Ltd, Bombay, on 29 April 1986, for the release of IIP know-how for the production of sulpholane and collaboration for pilot plant development. The process



Bench scale unit at IIP for the synthesis of sulpholane

has been demonstrated to the licensee on laboratory scale. Based on this technology, a 200 tonnes/annum plant will be set up shortly.

Sulpholane, a highly polar solvent, is widely used for extraction of aromatics from reformat, light naphtha and kerosene. It also finds use in removal of acid gases like hydrogen sulphide, carbon dioxide and sulphur dioxide from a variety of sour gas streams, fractionation of fatty acids into saturated and unsaturated portions and as a solvent for spinning and casting of polyacrylonitrile.

In India, sulpholane is used at present for extraction of aromatics in three plants. With the development of an indigenous IIP-EIL technology using this solvent, many more plants are expected to use sulpholane as solvent. Its present demand of about 100 tonnes/annum is likely to rise to more than 200 tonnes/annum by 1990.

In the IIP process, sulpholane is manufactured by the reaction of butadiene with sulphur dioxide and its subsequent hydrogenation. The product meets the specifications for solvent grade sulpholane.

Preliminary estimates indicate an investment of about Rs 40 lakh for a 200 tonnes/annum grassroot plant. The cost of production at full capacity is estimated to be Rs 26,000/tonne, and Rs 44,000/tonne at 30% capacity. The current landed cost of sulpholane is around Rs 85,000/tonne. Indigenous production of sulpholane would result in an annual saving of two crore rupees in foreign exchange. □

Study of Traffic Flow Measurement in Selected Cities of India

The Government of India has set up a Study Group to recommend systems that could be developed to meet the requirements of urban transport in the country, with the following terms of reference: (i) To recommend alternative

systems of urban transport which could be developed using the latest available transport technology; (ii) To recommend parameters for such systems to suit Indian cities and conditions; (iii) To establish capabilities and costs of various systems manufactured internationally and the expertise and general commercial condition with which they are available looking at the trade offs between various alternatives; and (iv) To consider any other issue relevant to the subject.

The Study Group examined the available data obtained during the various traffic and transportation studies carried out for various metropolitan cities and

other urban centres and came to the conclusion that it was necessary to carry out a limited survey of traffic volumes on selected corridors, along with occupancy data, in the following 14 cities: Ahmedabad, Lucknow, Moradabad, Jaipur, Pune, Varanasi, Coimbatore, Indore, Ludhiana, Gauhati, Mangalore, Chandigarh, Cuttack and Kanpur. The Coordinating Secretary, Ministry of Transport, assigned this work to the Central Road Research Institute (CRRI), New Delhi, as a national priority project. The field work in all the 14 cities has since been completed. The report is under preparation. □

Central Neurochemical Modulation of 'Baroreflex'

Bhatnagar Prize-winner Dr Sinha's Work

The most significant contribution of Dr J.N. Sinha has been elucidation of the intricate central neurotransmitter receptor mechanism in the specific brain-stem nuclei involved in the integration of the 'Baroreflex'.

Employing the method of volume loading for the activation of 'baroreflex' along with simultaneous stereotaxic microinjection into more than one brain area/nucleus of a series of specific agonists and antagonists for the first time, Dr Sinha and his coworkers characterized the nature (subtype), defined the location (pre/post synaptic) and elucidated the physiological function of various receptors in discrete brain nuclei.

These indepth studies clearly elucidated the pathway of the 'baroreflex' in the brain-stem. It was demonstrated that nucleus tractus solitarius (NTS)-nucleus ambiguus (AMB)-dorsal motor nucleus of vagus

(DMV) wing modulates the heart rate through the efferent vagus, whereas the NTS-lateral medullary pressure area (LMPA) wing of the 'baroreflex' modulates the resting blood pressure via the efferent sympathetic outflow. The ac-



tivity of the medullary nuclei was found to be modulated by the descending noradrenergic projections from pontine nucleus locus coeruleus (LC) and hypothalamus. The noradrenaline, released at the level of medullary nuclei (NTS, AMB, DMV and LMPA), activated the post-synaptic α_1 adrenoceptors to inhibit the 'baroreflex' activity. The release of noradrenaline from the descending inhibitory projections at these medullary nuclei was inhibited by the activation of α_2 -

Dr J.N. Sinha, Reader, Department of Pharmacology and Therapeutics, K.G. Medical College, Lucknow, has been awarded the 1984 Shanti Swarup Bhatnagar Prize in medical sciences (along with Dr B.S. Srivastava of the Central Drug Research Institute, Lucknow) [CSIR News, 36 (1986) 29].

adrenoceptors situated presynaptically on the noradrenergic neurones. These α_2 -adrenoceptors were not only physiologically important for inhibiting the inhibitory influence on baroreflex but also appeared to be the site of hypotensive and bradycardiac effects of the centrally acting anti-hypertensive agent clonidine.

Attempts were also made to characterize the nature and delineate the function of cholinceptors of various medullary nuclei. The muscarinic (m) cholinceptors, having a cardioinhibitory function, were found to be present only in the site of origin of efferent vagal fibres (AMB and DMV) and not in NTS. The m-cloniceptors of LMPA were found to exert an inhibitory influence on blood pressure regulation. Further attempts to characterize the tryptaminergic (5-RT) receptors revealed that they were absent in NTS, the first synapse of the baroreflex as well as in the vagoinhibitory cardiac nuclei (AMB and DMV). However, 5RT receptors having an inhibitory function over the vasomotor tone could be detected in the LMPA.

Thus, the most important neurotransmitter mechanism in the central nervous system (CNS) concerned with baroreflex modulation is the catecholaminergic (noradrenergic) system. The nodal source of noradrenergic projections in the central nervous system, the pontine locus coeruleus (LC) and subcoeruleus (SC) complex is of paramount importance in central cardiovascular regulation. Dr Sinha and his coworkers have recently shown that LC regulates the cardiovascular system through LC-hypothalamus-adrenal axis, whereas SC does so through the descending projections to the spinal preganglionic neurones. In addition, the existence of α_1 -adrenoceptor mediated physiological feed back mechanism was also demonstrated at the level of LC.

Another area was the study of turnover of catecholamines (adrenaline, noradrenaline and dopamine) in the

hypothalamus (anterior and or posterior). It was clearly demonstrated that if the systemic blood pressure rises, the turnover of catecholamines (CA) increases in anterior hypothalamus but if the systemic blood pressure falls the increase in CA turnover is seen only in the posterior hypothalamus. Moreover, the release of catecholamines, at least in posterior hypothalamus, was found to be totally dependent upon the activity of the brain stem structures. The hypothalamic catecholaminergic system, therefore, was found to be very

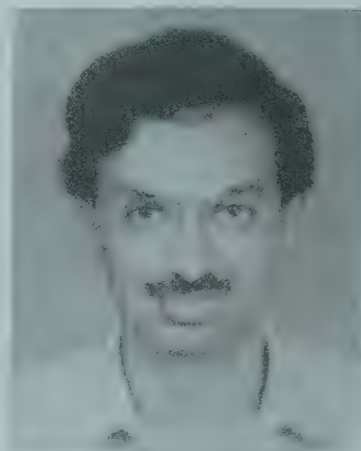
important for cardiovascular regulation. It also appeared that increased activity of the LC complex neurones can initiate the development of hypertension.

Dr Sinha received his graduate and post-graduate degrees in medicine from the King George's Medical College, Lucknow. Subsequently, he was absorbed in the teaching cadre of the college as Lecturer in 1966 and is at present Reader in the Department of Pharmacology.

Dr Sinha became Fellow of the International Union of Pharmacologist (IUPHAR) in 1972. In 1978, he was awarded the Alexander von Humboldt Foundation fellowship of FRG. In 1982, he was elected Member of the International Brain Research Organization (IBRO-WHO). A recipient of the 1983 'Hari Om Ashram Research Award' for his contributions on brain neurotransmitter mechanisms in health disease and drug action, he has 150 original research papers to his credit. □

Errata

Instead of Prof. R. Shashidhar's photograph that should have appeared in the article 'High pressure studies of liquid crystals: Bhatnagar prize-winner Prof. Shashidhar's work' [*CSIR News*, 36 (1986), 85] that of Dr J.N. Sinha has been printed inadvertently. The photograph of Prof. Shashidhar is given below:



Scientific Commission to Study Effects of Bhopal Gas Leakage on Life Systems

In the note on the above Commission, published in *CSIR News*, 36 (1986), 81, Dr C.R. Krishna Murti has been referred to as Director instead of Former Director, Industrial Toxicology Research Centre (ITRC), Lucknow.

The errors are regretted. □

Ethion

NRDC Award-winning Process *

Ethion, O, O, O, O—tetraethyl, S-S'-methylene di(phosphorodithioate), is a non-systemic insecticide and acaricide used mainly on tea plantation and on dormant fruit in combination with petroleum oil to kill eggs and scales. It is non-phytotoxic except to the apple varieties maturing with or before early McIntosh. It is made by the interaction of dibromomethane with O, O-diethyl sodium phosphorodithioate.

The present process, developed by the National Chemical Laboratory (NCL), Pune; obviates the use of large

* The announcement of the National Research Development Corporation of India's 1986 Republic Day award for a team of six NCL scientists who have developed a process for the manufacture of 'ethion' has been made in *CSIR News*, 36 (1986), 13.

amounts of organic solvent. Also, the reaction is carried out conveniently in aqueous medium employing a phase transfer solvent system which enhances the solubility of methylene bromide. The novelty of the NCL process thus lies in carrying out the heterogeneous reaction at an appreciable rate even in aqueous medium with the use of a small quantity of a phase transfer solvent to overcome the phase boundaries of the two reactants. The use of water as solvent also avoids the precipitation of sodium bromide in the reaction mixture as in the case of the processes where alcohol is used as the reaction medium. It reduces the capital expenditure on centrifuges, etc. and greatly simplifies the process. The yield by the NCL process is also higher (approximately 95%) than the yield reported in other processes described in the literature.

Brief Profiles of the Inventors:

Dr R.B. Mitra

Dr Mitra is a B.Sc. (Hons.), B.Sc. (Tech.), and Ph.D (Tech.) of the

Bombay University. He has been working in NCL as Deputy Director since 18 September 1967 and as 'Scientist in Director's Scale' since July 1982. He has been the coordinator for projects on: endosulfan, dimethoate, ethion, carboxin, theophylline/aminophylline and t-butyl catechol. A recipient of the K.G. Naik Gold Medal (1979) for research leading to application in industry, Dr Mitra has about 80 research papers to his credit.

Dr B.B. Ghatge

An M.Sc. and Ph.D. in organic chemistry, Dr Ghatge joined NCL in 1958 and is at present Scientist EI. So far eight M.Sc. students and five Ph.D. students have got their degrees under his guidance. He has about 50 research papers to his credit.

Dr S.M. Abhyankar

Dr Abhyankar is a B.Sc., B.Sc. (Tech.) and Ph.D. (Tech.). He is working in NCL as Scientist E in the Process Development Division and is at present

heading a group of chemical engineers engaged in the projects on: acetanilide, dimethylaniline, colchicine, acrylic acid, theophylline, aminophylline, caffeine, dimethoate, carboxin, nicotine sulphate, endosulfan, etc. He is also in-charge of a cell at NCL for rendering assistance to small scale manufacturers.

Dr Sobhan Ghosh

Dr Sobhan Ghosh is a B.Sc. (Hons.), B.Tech. and a Ph.D. At NCL, Dr Ghosh was engaged as a senior chemical engineer in the design of chemical process plants, pilot plants and cost estimation of different projects of NCL; design and extraction of ultrapure silicon pilot plant; and design of a semi-commercial integrated pilot plant for the manufacture of polyphenylene sulphide. He was also a project leader in the Polymer Group of the Chemical Engineering Division of the project on the development of a process for the manufacture of polyphenylene sulphide polymer. He contributed effectively to the complete know-how packages for ethion, dimethoate, endosulfan, vita vax, etc. Presently, he is working as Technical Manager with the Indian Oil Corporation Ltd, Faridabad.

Shri M.B. Unde

Shri Unde holds an M.Sc. (Chem. Engg.) degree of the Salford University and Associateship (Chem. Engg.) of the Heriot Watt College, Edinburg, UK. At NCL, he initially worked in the Division of Technical Services of NCL and did cost engineering and some other functions related to research and development. Presently, he is working in process development related to different projects of pesticides, drugs, catalysts, etc.

Shri Nand Kishore

Shri Nand Kishore did his graduation and post graduation (Chem. Engg.) from HBTI, Kanpur. Since his joining



The NRDC award winning inventors(from left) are: Shri M.B. Unde, Dr B.B. Ghatge, Dr R.B. Mitra, Dr S.M. Abhyankar, Shri Nand Kishore and Dr D.G. Panse

NCL, he has been actively participating and contributing to various projects such as pesticides, drugs and catalysts.

Dr D.G. Panse

Dr Panse is an M.Sc. and a Ph.D. (gas-liquid chromatography). Since his joining NCL (1966) he has acquired wide experience in synthetic as well as analytical field. Besides, he has worked on various organophosphorous pesticides, viz. phosalone, imidan, ethion, etc. □

PROGRESS REPORTS

CGCRI Annual Report: 1984-85

The annual report of the Central Glass & Ceramic Research Institute (CGCRI), Calcutta, for the year 1984-85, shows that during the year the laboratory continued to lay emphasis on optimum resource utilization including energy conservation, development of technologies for critical areas of the country's economy, e.g. steel, engineering and electronics industries, defence and atomic energy, building materials and on providing technical assistance and consultancy services to the related industries. Due importance was also given to the needs of the glass and ceramic industries in the small scale and rural sectors.

Four processes were released to industry, two for the first time, for commercialization, viz. (i) manufacture of insulation bricks from rice husk ash by phosphate bonding and (ii) manufacture of optical glass of different types. The other two were: (i) ceramic colours and (ii) manufacture of sodium silicate from rice husk ash. In the case of the latter process, project engineering back-up was provided to the licensee.

The institute's optical glass pilot plant established an all time record in production. The total value of optical glass production amounting to Rs 38.63 lakh exceeded the total expenditure of the plant for the year. Optical glass val-

ued at Rs 22.05 lakh was sold to Defence and other organizations.

Several runs were carried out during the year for making multi-mode graded index preforms as well as single mode preforms for producing communication fibres. Fibres were drawn from the preforms through arrangements with research laboratories abroad and some characterization data were also obtained from them. The communication fibre drawing system was also installed. Basic laboratory facilities were organized, and concentrated efforts were made for installation and commissioning of experimental set-ups for attenuation measurement and determination of refractive index profile by near field scan techniques. For this, the control instruments were suitably mounted, the performance of the various components was tested, and these were installed and commissioned. Fibre holders with x-y movement and a fibre cutter were designed and fabricated.

The institute made efforts for the development of technology for utilizing common clays for making heavy clay-ware and crockery. These common clays are available in abundance in various parts of the country and are much cheaper than china clay.

Investigations were carried out on a common clay from Jaynagar (West Bengal). By suitable adjustment of composition and addition of appropriate electrolytes a body having good casting property was developed. Articles were made in different shapes and designs by casting. A specially developed fritted glaze was applied on these articles and fired at 1000°C. Satisfactory results were obtained.

Attempts were made to develop glazes for wall tiles maturing at lower temperatures (850°-900°C). Results obtained in some trials were encouraging. Efforts were continued for development of the matt glazed floor tiles using Gangetic silt deposit from Uttarpara (West Bengal). The mattness of the glazes remained unchanged when fired within the temperature range of 950°-

1020°C. Higher firing temperature led to semi-glossy finish. Some of the glazes also showed promising results with single firing system. The water absorption of the single fired floor tiles was reduced to 12-14% as compared to the values of 18-20% for wall tiles. R&D work on this process was completed and developmental activities were continued.

A demonstration unit was set up at the institute for upscaled production of the fibre glass reinforced gypsum (GRG) composite to facilitate transfer of technology to entrepreneurs as well as for evaluation of its properties and study of compatibility of the composites made with other types of low grade gypsum. The chemical, mechanical and weathering properties of the composites were studied. Flexural strength was found to be in the range of 28-37 MPa while the impact strength was in the range of 18-22 Nmm/mm². The cost of the material was estimated to be about 50% cheaper than wood. A mica-based texturized coating developed earlier was applied on GRG doors to improve the strength retention properties when used outdoors. Several doors and false ceilings made out of GRG boards were installed at the institute as well as at the Khurja Extension Centre. The process is ready for commercial exploitation. Several construction agencies as well as the Government of West Bengal have shown their interest in the use of GRG composites as a substitute for wood in the fabrication of doors, partitions, etc. in their construction projects.

A batch calcinator of 800 kg capacity for calcination of gypsum used in the production of plaster of Paris was designed, fabricated and installed.

Reaction bonded silicon nitride (RBSN) having MOR of 22,000 psi at room temperature and 30,000 psi at 1400°C and a fracture toughness of 3.5 MNm^{-3/2} was developed. Composite materials made from RBSN and silicon carbide were also developed and it was found that at a certain percentage of

silicon carbide, there was a peak in the strength and fracture toughness of the material. A value of above $4 \text{ MNm}^{-3/2}$ was achieved for such composite materials. Work was also taken up for the fabrication of high strength reaction bonded silicon nitride bodies by slip-casting. Product made from this material for use as liquid metal spraying nozzle was successfully tried at a reputed metallurgical plant. The party is now interested in obtaining a large number of such nozzles.

During the year, silicon nitride powder of a specific chemical composition, oxygen and nitrogen content and surface area was developed. Silicon nitride powder is finding increasing use in the steel industry. Dense silicon nitride was made for the first time in our country by liquid phase sintering, thereby avoiding costly hot pressing procedure. Products having density above 98% were prepared. MOR was higher than 70,000 psi (4-point bending) at room temperature and 50,000 psi at 1000°C . A fracture toughness value of $9.9 \text{ MNm}^{-3/2}$ was achieved which is higher than the values reported in advanced countries. Young's Modulus of $3 \times 10^5 \text{ MN/m}^2$ and creep rate of 0.0017 per cent per hour at 1200°C for a load of 100 MNm^2 were also achieved. The effect of different sintering liquids, oxidation resistance, effect of crystallization due to heat treatment on the strength of the materials, etc. was studied. Four different sintering systems were examined. The properties of the material rendered it comparable or even superior to the sintered silicon nitride developed recently in the advanced countries. A reputed engineering concern has shown interest in this particular material for use in diesel engine parts and has expressed its desire to set up plants for manufacturing silicon nitride in the near future.

The institute has built up for the first time in India facilities for the study of high temperature fracture of brittle solids with the help of a grant-in-aid obtained from the Ministry of Defence.

Procedures for study of fracture toughness using SENB technique as well as indentation techniques were established and standardized.

A pilot plant for the production of sodium silicate (0.5 tonne/day) from rice husk ash was installed and commissioned. Several runs were carried out for the production of sodium silicate ($\text{Na}_2\text{O} : \text{SiO}_2, 1:2$). The process was demonstrated on the pilot plant to a licensee of the process.

During the year, 33 papers were published, 19 were communicated for publication and 17 were presented at seminars/conferences. □

NEW PUBLICATIONS

Pedestrian Safety Aspects in Delhi—Awareness, Opinions & Preferences

The Central Road Research Institute (CRRI), New Delhi, with the cooperation of Delhi Traffic Police, conducted a survey relating to pedestrian safety aspects at their Pavillion at the International Trade Fair at Pragati Maidan, New Delhi, in November 1984. Over 3000 persons of various age groups, occupation, and driving status participated. The title report gives the results of various analyses of the data thus collected. It discusses the 'engineering' 'education' and 'enforcement' approaches to increase the safety of the pedestrians.

The survey was conducted by a study team of Dr S.M. Sarin (study leader), Shri S.M. Lal, Shri Madan Lal and Smt. Shashi Chhabra. The team was assisted in field work by Dr S.K. Bhalla, Shri Vijay Sethi and Shri Devender Chopra. The analysis was done by Shri Harcharan Singh.

Enquiries pertaining to the publication (demy 4 to, pp 38) may be addressed to the Director, CRRI, New Delhi.

Traffic Safety Awareness Among Road Users in Delhi

The Central Road Research Institute (CRRI), New Delhi, in cooperation

with the Delhi Traffic Police, conducted a traffic survey in November 1983, involving over 1000 participants covering a broad spectrum of age groups.

The title report contains the data thus developed, the analyses and the findings. The report emphasizes the need for strengthening road education of younger age groups so that the road traffic can be moved more efficiently and safely.

The survey was conducted by a study team comprising Dr S.M. Sarin (study leader), Dr S.K. Bhalla and Shri S.M. Lal. The study team was assisted in field work/analysis by Shri M.L. Sharma, Shri Subhash Kaushal, Shri Harcharan Singh and Smt. Shashi Chhabra, and in field work by Shri Vijay Sethi, Shri D.K. Mehta and Davender Chopra.

Enquiries pertaining to the publication (demy 4to, pp 46) may be addressed to the Director CRRI, New Delhi.

PERSONNEL NEWS

Appointments/Promotions

At the Central Glass and Ceramic Research Institute (CGCRI), Calcutta, Dr B.C. Sinha has been promoted, on assessment, as Scientist EII, and Dr T.K. Bandyopadhyay, Dr D. Ganguli, Shri B.B. Nag, Shri S.K. Tarafdar and Dr B.N. Bhattacharyya have been promoted, on assessment as Scientists EI.

The brief profiles of these scientists are presented below:

Dr B.C. Sinha *

Dr B.C. Sinha (born, 2 Feb. 1927) is an M.Sc. in Chemistry from the Dacca University and Ph.D. from the Calcutta University. After serving as a Lecturer in chemistry for two years he joined CGCRI in November 1955.

Dr Sinha, presently heading the Analytical Chemistry Division of

* The effective date of promotion of Dr Sinha is 8 May 1984 and not 8 May 1985, as announced in *CSIR News*, 36 (1986), 27.

CGCRI, is well known for his contributions in analytical chemistry. His field of research is inorganic analytical chemistry involving complexometry and polarographic and spectroscopic techniques.

Dr Sinha visited UK in 1972 to study modern instrumental techniques of analysis at the Strathclyde University, Glasgow, Imperial College of Science and Technology, London and Scottish Research Reactor Centre, Scotland (for neutron activation analysis study) under a CSIR-British Council Exchange Programme of Scientists.

Dr Sinha worked as United Nations (UNIDO) Expert in Laboratory and Process Research during 1975-76 and again as UN-TCD Expert (Chemist/Analyst) during 1980-84. During 1981-82 he acted as United Nations Chief Technical Adviser of a project in Somalia.

He is a recipient of the Ganpule Award for the best paper published in the *Transactions of the Indian Ceramic Society* during 1975-76. He is a Fellow of the Institution of Chemists (India).

Dr Sinha has 60 research papers to his credit.

Dr T.K. Bandyopadhyay

Dr Tarun Kumar Bandyopadhyay (born 15 April 1940) is an M.Sc. in Geology from the Calcutta University (1961). He received his Ph.D. from the same university (1968) for his thesis entitled 'Crystallographic studies of natural and synthetic quartz'. Joining CGCRI in 1963, he studied the growth of quartz and their effects on the final quality of the grown crystals. Thereafter, he carried out R&D work on different problems of crystal growth including growth of high quality magnetic garnet crystals and their processing into microspheres for use in the microwave frequency range.

In 1971-72 he visited FRG for 16 months under the DAAD fellowship to study annealed structure of evaporated

thin films. In 1983 he again visited FRG for 3 months under the CSIR-KfA agreement and worked on preparation of optic fibres for communication. Presently, Dr Bandyopadhyay is leading a project team of scientists working on development of high-silica glass preforms by MCVD technique, drawing of optical communication fibres and their characterization.

Dr Bandyopadhyay has 19 research papers to his credit. He is a life member of the Indian Ceramic Society and a member of IACS.

Dr D. Ganguli

Dr D. Ganguli (born in 1940) obtained his M.Sc. (1961) and Ph.D. (1968) degrees from the Calcutta University. He joined CGCRI in 1964, where he carried out researches on high temperature phase equilibria, and preparation and characterization of molecular sieve zeolites. Dr Ganguli did his post-doctoral work at the Institut für Mineralogie, Ruhr-Universität, Bochum, FRG, during 1970-71. He was a joint recipient of the Malaviya Award of the Indian Ceramic Society for his papers on zeolite research in 1975 and 1976. His current research interests include preparation and characterization of ultrafine powders and thin films of ceramic oxides by the sol-gel technique. He is a recognized Ph.D. supervisor of the Jadavpur University.

Author of about thirty-five scientific papers including a book chapter, Dr Ganguli is the Honorary Editor of the *Transactions of the Indian Ceramic Society*, and co-editor of the text book series *Elements of Ceramic Science*, and a handbook entitled *Chemical Analysis of Ceramic and Allied Materials* (S. Dasgupta and S.K. Roy), all published by the Indian Institute of Ceramics. He was the convener of the Scientific and Technical Committee of the XIV International Congress on Glass held in New Delhi in 1986.

Shri B.B. Nag

Shri B.B. Nag (born 1 Nov. 1931), after obtaining his B.Sc. (Hons.) degree from Calcutta University, joined CGCRI in 1957. He became an Associate of the Institution of Chemists (India) in 1972.

Shri Nag has worked on various physico-chemical problems and has made some commendable contributions in glass science and technology such as (i) Development of glass compositions for reinforcement fibres by utilizing indigenous raw materials, (ii) Development of a low cost indigenous technology for manufacture of glass fibres in small scale sector and (iii) Development of glass-ceramic materials.

Shri Nag visited France (1970-71) under the Indo-French Technical Cooperation Scheme and worked in the Laboratory of Glasses (CNRS), Paris. He has seven research papers and one patent to his credit.

Shri S.K. Tarafdar

Shri S.K. Tarafdar (born 1 Jan. 1939) is a B.Sc. (Engg.) Mech. from the Banaras Hindu University. Before joining CGCRI in 1969 as Plant Engineer, he worked at the National Metallurgical Laboratory, Jamshedpur, in various capacities. Shri Tarafdar is at present engaged in producing valuable strategic materials at the optical glass pilot plant of CGCRI.

Dr B.N. Bhattacharyya

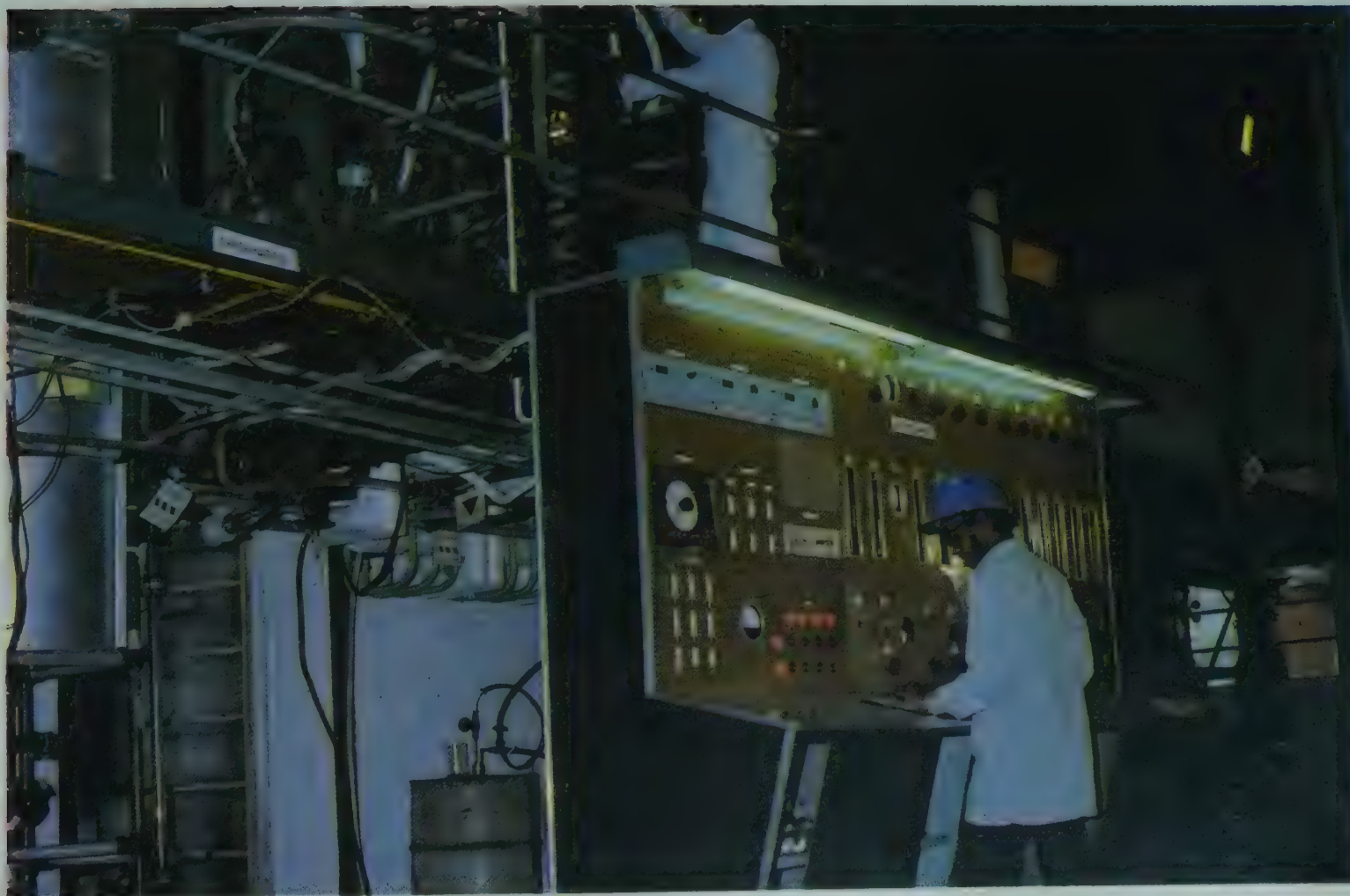
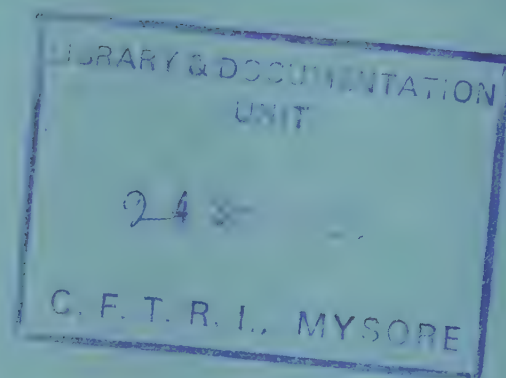
Dr B.N. Bhattacharyya (born in 1939) obtained his M.Sc. from the Jadavpur University and Ph.D. from the same university for his thesis on aluminium titanate. He joined CGCRI in 1962 and since then has been working on various projects related to ceramics, including special ceramics. He went to UK in 1976 under the CSIR-British Council Exchange Programme of Scientists. Dr Bhattacharyya is presently the Secretary of the Calcutta Chapter of the Indian Ceramic Society.

CSIR NEWS



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XIV International Congress on Glass

Under the aegis of the International Commission on Glass (ICG), an internationally registered body with its secretariat in Belgium, the XIV Glass Congress was held at Vigyan Bhavan, New Delhi, during 3-7 March 1986. It was sponsored and organized by the Central Glass and Ceramic Research Institute (CGCRI), Calcutta. The All India Glass Manufacturers' Federation and the Indian Ceramic Society were co-sponsors. The International Glass Congress is a triennial event where leading investigators and technologists in the field of glass from all over the world meet to have an up-to-date review of the problems and identify the directions and subjects for further research and development. It is organized in different countries in collaboration with the International Commission on Glass. The XIII Glass Congress was held in Federal Republic of Germany (Hamburg) in 1983. At Hamburg, ICG decided to hold the next Glass Congress in a developing country and

India was selected as the venue. The Commission selected Dr S. Kumar, a distinguished glass scientist and Director of CGCRI, Calcutta, as the President of the XIV Glass Congress and Dr K.P. Srivastava, Head, Glass Laboratory, CGCRI, as its General Organizing Secretary.

The XIV congress was inaugurated by the President of India, Giani Zail Singh. Shri Shivraj V. Patil, Minister of State for Science & Technology and Vice-President, CSIR, was the Chief Guest. Dr W.R. Prindle, President, International Commission on Glass and Director of Materials Research, Corning Glass Works, New York (USA); Dr J. Gotz, Secretary of the Commission and a renowned silicate scientist of Czechoslovakia and Shri M.F. Hubert, Honorary Treasurer of the Commission were present during the congress. Besides, most of the members of the executive body of the Commission also attended the congress.

About 400 foreign delegates from 30 countries and about 225 Indian delegates representing the industry, R and D establishments and academic institutions participated in the congress. The foreign countries included USA, UK, USSR, FRG, France, Belgium, Bulgaria, China, Japan, Italy, Hungary, Holland, Poland, Spain and Czechoslovakia.

During the five-day conference the congress discussed the latest advancements made around the world in the science and technology of glass and allied materials which now find applications in a host of frontier areas of technology and hold promise for further newer applications, and exchanged information. The 19 technical sessions which formed the main focus of the congress covered various aspects such as chemistry and physics of glass, glass technology, furnace designs, process control in melting, refractories for the glass industry, applications of glass, archaeometry of glass, etc. In the oral sessions about 150 papers, 9 invited lectures and one keynote address were presented. In the poster session, nearly 70 posters were presented. The papers accepted for presentation were pre-printed in three volumes. A companion volume containing the abstracts of these papers in the three official languages i.e. English, German and French was also published.

Inaugurating the congress, Giani Zail Singh appealed to the galaxy of the participating scientists to take a stand against destructive use of the science and take a vow that they would co-operate only on constructive research. He referred to the success of science in discovering newer and newer materials whether it was glass or plastic or any other material, pointing out that the question before mankind had become one of sheer survival. The President of India urged that the nations of the world should look towards their



Giani Zail Singh, President of India, and Shri Shivraj V. Patil, Minister of State for Science & Technology and Vice-President of CSIR, being garlanded at the inaugural function of XIV International Congress on Glass, held at Vigyan Bhavan, New Delhi

The addresses of Shri Shivraj V. Patil, who was the Chief Guest at the Congress, and Dr S. Kumar, Director, CGCRI, have already been published in *CSIR NEWS* 36 (1986), 67.

men of science not in desperation but in hope for joining hands and finding correct and stable solutions.

Shri Shivraj V. Patil in his address stressed the need for upgradation of technologies in the Indian glass industry. He informed the congress that the output of optical glass, laser glass, T.V. glass shells and special glasses for advanced electronic industry, nuclear installations, etc. would be growing in the country to meet the rising demand for them. He announced that India would be shortly switching over to optical fibre in telecommunications. The country's need then would rise to 1200 km of optical fibre/annum. He called for a strong knowledge base and infrastructure of technical expertise in this field.

As a part of the congress, a trade exhibition of glass and glassware; machinery, equipment and tools for glass industry; furnace materials/equipment, etc. was also arranged at Ashok Hotel, New Delhi. The exhibition provided an overview of the technological achievements in the field. It also gave an opportunity to the suppliers and potential buyers to discuss personally their technical problems and possible solutions. The highlights of the exhibition were indigenous technology and international trends in a variety of applications of glass such as crystal glass tableware, signal transmission through optical communication fibres, and in the sophisticated field of laser. The contribution of CGCRI in these frontier areas of research formed a significant part of the exhibition. Also, a documentary film on glass, specially produced by CGCRI for the occasion, was screened. The film depicted the important milestones in the history of glass till the modern times and projected the present Indian glass scenario against the global perspective.

A post-congress five-day training course in glass was also held for the benefit of the technical managers and senior executives in the glass manufacturing units in the developing countries. The faculty of the course comprised recognized international experts drawn from the delegates. □

Dr Ram K. Iyengar appointed Additional Director General, CSIR

Dr Ram K. Iyengar, Chairman-cum-Managing Director, National Industrial Development Corporation Limited, New Delhi, has joined as Additional Director General, CSIR, with effect from 16 June 1986 (AN). He is concurrently Additional Secretary in the Department of Scientific & Industrial Research.

Dr Iyengar (born 13 March 1940) did his B. Tech (Hons) (Met. Engg.) from the Indian Institute of Technology, Bombay (1963), and M.S. (Met. Engg.) and Ph.D.



(Material Sc.) from the Carnegie Mellon University, Pittsburgh Pa, USA (1965 and 1968 respectively) where he carried out pioneering studies on formation and motion of micron size particles in liquid metal.

He joined Jones & Laughlin Steel Corporation, USA, as Project & Research Engineer in 1966 and was responsible for quality control and process improvement. He pursued several programmes related to the development of continuous casting technology. A significant contribution of Dr Iyengar there was the development of calcium deoxidized steel which is used at present in large quantities as highly machinable steels.

He introduced computer-based process control of basic oxygen steel making

and argon oxygen refining process for making stainless steel. His pioneering work on slag making reactions led to the development of refractory and flux practices in steel making which has increased refractory performance world wide. He holds a US Patent on a special flux used in steel making.

In September 1974, he was invited to the Institute for Steel Technology, France, where he developed a computer-based model for continuous steel making process, and evaluated potential of existing steel technologies in the developing countries.

In 1975, Dr Iyengar joined the R&D Centre of Steel Authority of India Limited, Ranchi. There he was responsible for developing a long term plan for R&D in the field of iron and steel in India. He carried out techno-economic survey which resulted in the identification of the appropriateness of the new technologies vis-a-vis the conventional ones. The job also included training of engineers to under-

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take R&D projects in a systematic manner, planning laboratory facilities for carrying out the various experiments as well as R&D programmes in the existing steel plants. In addition, he carried out a large number of technical and economic impact analyses of the new technologies in the field of steel making and manufacture of steel products. During this period he underwent training in general management as well as corporate planning.

Moving to the Rourkela Steel Plant in 1978, Dr Iyengar was incharge of a large project for setting up of silicon steel manufacturing unit. The job involved unpackaging of the complex technology which was provided by a leading US corporation and coordination of plans of action for implementing the same. In addition to this project he was responsible for identifying and implementing short term modernization schemes for increasing the productivity of the steel plant. During the three-year stay at the Rourkela plant he was trained in the corporate management including financial management, market development and economic analysis of the national environment for identifying opportunities for further growth of the corporation.

In August 1981, Dr Iyengar took over as Chairman-cum-Managing Director of NIDC, which is a premier organization dedicated to the industrial development not only in India but also in other developing countries.

As head of the Corporation Dr Iyengar's major key result area was the profitability of the Corporation on a short term as well as long term basis. This involved corporate planning including identifying the markets where the strengths of the Corporation can be better utilized.

He directed several industrial opportunity surveys for Kerala, Haryana, Union Territory of Goa, Tamil Nadu, Rajasthan, and for several developing countries. Market forecasting and market research studies were carried out for light commercial vehicles, aluminium and other industrial products. Status and modernization studies of industries in the small and medium sector were also carried out. He directed a large number of feasi-

bility studies for customers in the private and public sector in India and abroad, on offshore drilling equipment, commercial vehicles, engineering products like diesel pump sets, builders hardware, sanitary fittings, furniture and ophthalmic glass. Other projects directed by him related to electronic factories, mechanical workshops, precision components factory, telecommunication cable manufacturing units, etc.

He was also involved in the studies for the rehabilitation and modernization of industries in Uganda; for setting up of an industrial complex in Zanzibar, Tanzania; for preparing detailed feasibility reports on eight projects in Libya; several projects in Yemen and one project in Nepal. An Algerian project involved the management of textile units in Algeria. Dr Iyengar is associated with several pro-

fessional/advisory bodies, e.g. he is Executive President, Project Management Research Society of India; Vice-President, National Association of Consulting Engineers; Member, Executive Board, Standing Conference on Public Enterprises; Member, R&D Committee, Association of Indian Engineering Industry; and Member, Scientific Advisory Board, Department of Steel.

He was invited to co-author a chapter on BOF Monogram series AIME USA, on process control in BOF steel making. He has published a large number of papers in US, Japanese and German journals. He is recipient of the National OH Conference Award and the Robert Hunt Silver Medal of the American Institute of Mining, Metallurgical and Petroleum Engineering (AIME) and Distinguished Alumnus Award of IIT, Bombay. □

Dr Pakrashi Stresses the Role of Youth in India's Science Progress

Dr S.C. Pakrashi, Director, Indian Institute of Chemical Biology, Calcutta, addressed the inaugural session of the 11th Annual Conference of All India Science Teachers' Association, West Bengal, held on 30th March 1986. In his address Dr Pakrashi lauded the efforts of the Association in elevating the standard of science education in the state. Congratulating the students who had won awards during the various contests organized by the Association, Dr Pakrashi said:

I, for one, as a student of science, a researcher of long standing, a university teacher as well as a science administrator, have great faith in our younger generation. I am confident that they will be able to uphold the dignity and enhance the scientific prestige of the country with their talent, devotion, competence and what is very much lacking today — the sense of self-respect and self reliance.

This reminds me of an interesting dis-

cussion I had with Dr John Maddox, the Editor of *Nature*, in connection with the article he later published in that presti-



gious international scientific journal on the progress of science in India. I told him that to appreciate the advancement of science one should take into account the facilities and opportunities for the pursuit of science prevailing in the country at the dawn of independence. The

facilities available were rather primitive and the funds pitifully meagre. Today, India at least can boast of ranking third in the world in scientific manpower.

This itself is not a mean achievement within less than forty years for a developing country exploited by foreign powers through centuries. Not only that, Indian scientists are rated very high and are very much in demand even in the most advanced country like USA. The emphasis India puts on the development of science and technology in the country is well-apparent from a full fledged department for the purpose directly under the Prime Minister. We have now apex scientific agencies such as Council of Scientific & Industrial Research with a chain of national laboratories throughout the country, Indian Council of Medical Research, Indian Council of Agricultural Research with a number of research laboratories, Bhabha Atomic Research Centre, National Biotechnology Board apart from, Defence research laboratories and science departments of the ever-increasing number of universities and technological institutions. Therefore, if not anything else, our country has been able to train scientific manpower, develop infrastructure facilities and scientific attitude — the prerequisites for the growth and development of science in any country. And now we are at what may be termed as the 'take off' stage.

I, myself take pride as an Indian scientist. I, therefore, not only wish but also urge upon my younger friends who do care for the advancement of science in the country also to feel the same way. Because, nobody with inferiority complex can ever succeed. We have nothing to be ashamed of. We have a proud heritage even in scientific field which was eclipsed by foreign rule for many centuries. With self confidence and devotion we can not only compete favourably well with the scientific advancement in the world of tomorrow if not today, but also can go ahead of others.

I must now compliment the All India Science Teachers' Association for its laudable efforts to elevate the standard of science education in the state, particu-

larly rural areas, through seminars, extempore talks, quiz test, science talent search test, etc. I was amazed to learn from the last year's report that around twelve thousand students contested in the talent search test. The Association should be congratulated for conducting the gigantic task with their meagre resources. However, to pass on as much benefit as possible to the really deserving and promising students, I think that the Association may seek the grant giving authorities like the University Grants Commission, Department of Science and Technology, Council of Scientific & Industrial Research, Indian National Science Academy and the like.

The Association may perhaps ensure that the cash awards are received by those who need them most for prosecution of their studies, subject always to maintaining a proper standard, while the talent of more privileged students may be recognized by merit certificates. This type of discrimination is also done in case of award of many scholarships.

To be fair to the students of rural areas, a separate standard of test from that for the urban areas may also be considered on the premises that given a proper opportunity, underprivileged but promising students would be able to favourably compete with the privileged ones in future.

What is more important for the Association is to develop scientific awareness by dissemination of scientific information in various strata of the society to popularize science and to create scientific temper. The seventh plan document recognizes, '...in a science and technology-fuelled world some degree of understanding of science and technology is necessary for all citizens'. The scientific temper may be defined as an attitude of human mind related more to the method rather than the content of science. This cannot be created by merely understanding lectures and programmes about the marvels of science or achievements of technology. This is exactly where the All India Science Teachers' Association with its vast network of schools in rural areas can play a vital role, particularly when the

newly set up National Council for Science and Technology Communication, with its Secretariat in the Department of Science and Technology, is committed to encourage and facilitate all activities aimed at dissemination of science and creation of scientific temper.

The National Council of Science Museum also plans to set up district 'science centres' which are expected to provide support to voluntary science movements designed to realize the full potential of science 'for eradication of irrational attitude which tends to hold back the nation from the path of progress.' Let us all join hands and concentrate our efforts in concerted actions to regain our past glory in the field of science and be a world leader once again. In this hope we have to rely entirely on our younger generations whom I wish very bright success and future. □

50th Annual Session of the Indian Ceramic Society

The 50th Annual Session of the Indian Ceramic Society was held in Calcutta during 7—9 February 1986, with its main venue at the Central Glass and Ceramic Research Institute (CGCRI), Calcutta. The main body responsible for hosting and organizing the annual session was a reception committee with Dr S. Kumar, Director, CGCRI, as its Chairman. Shri Prolay Talukdar, Minister of Small Industries, Government of West Bengal, inaugurated the opening session.

Welcoming the delegates, Dr S. Kumar said that the State of West Bengal had not only a rich heritage of traditional pottery, but also it was here, over 125 years back, that the Maharaja of Cossimbazar had established in 1860 the first modern ceramic unit of the eastern region, which was probably also the second such unit in the whole country. The ceramic industry in the state enjoyed a favourable posi-

tion owing to the availability of raw materials, machinery and equipment, skilled manpower and necessary support of R and D. However, over the years, the ceramic industry in the state had not only become stagnant but had declined considerably. Mentioning about the improved technology package for pottery manufacture for the small scale sector, designed and developed by CGCRI, along with its two extension centres at Naroda and Khurja, the CGCRI Director said that acceptance and use of this package by the small scale sector would help cut down appreciably the wasteful consumption of fuel and environmental pollution.

Shri Talukdar, in his inaugural address, underlined the reasons which substantially hampered the process of growth of the industry in the region, and elaborated the measures taken to retrieve the earlier position and stimulate further growth.

The Session was attended by about 500 scientists and technologists from research institutions, government departments and industries in addition to many industrialists and entrepreneurs in the field. Apart from the inaugural session,

the first day function included a keynote address by Dr Kumar on 'Strategies for modernization of ceramic industry'. In all, there were eleven technical sessions spread over three days, including a workshop on 'Modernization of ceramic industry — scopes and problems'. In these sessions, over 50 papers were presented. In addition to the above, the programme included two invited lectures and a concluding banquet in which two eminent personalities in the field of ceramics, viz: Dr S.S. Ghose and Shri S. Deb, were felici-

tated with presentation of plaques of honour; the President of Indian Ceramic Society made a special presentation to Dr Kumar. Several scientists of CGCRI were presented with token gifts in appreciation of their role in organizing the meetings.

An exhibition of ceramic products was also opened in the evening of 7 February 1986 at Park Hotel by Shri Kamal Basu, Mayor, Calcutta Corporation. CGCRI also participated in this exhibition. □

National Seminar on Indian Patent System and the Paris Convention : Legal Perspectives

The Faculty of Law of the University of Delhi, in association with the National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, and with the support of the Department of Scientific & Industrial Research, organized a seminar on the Indian Patent System and the Paris Convention: Legal Perspectives, on 22 & 23 March 1986. A

noteworthy feature of this national seminar was that it brought together law professors, lawyers, judges, scientists, industrialists as also decision-makers from concerned government agencies, such as DSIR, NRDC, CSIR, etc. The aim of the seminar was to examine whether India should join the Paris Convention, which is already hundred plus years, for the protection of industrial property. Almost a hundred countries of the world have found the Convention acceptable and put themselves under its regime.

It was noted that it is not our policy to deny protection to foreign inventors under our Patents Law and that even now over 80% of the patents granted in India are to foreigners. The Patents Act of 1970 does provide for entering into bilateral agreements with other countries on the basis of reciprocity of national treatment and non-discrimination, the very principles underlying the multilateral Paris Convention. It is indeed not our policy to permit and encourage copying. On the contrary, India promotes patenting and their exploitation both by Indians and foreigners on equal footing, provided that patents are applied for and obtained under our law. Foreign inventors can obtain protection in India only if a patent is applied for and obtained in India under our law. But then the Paris Convention also does not create an interna-



Shri Prolay Talukdar, Minister of Small Industries, Government of West Bengal, delivering the inaugural address at the 50th annual session of Indian Ceramic Society. Seated on the dais (from left) are: Dr S. Kumar, Director, CGCRI; Shri S.K. Ghosh, President, Indian Ceramic Society; and Dr K.P. Srivastava, Scientist, CGCRI

tional patent, or abolish the national patent regime.

Some fear was expressed that the 'right of priority' espoused by the Convention (whereby, if an application is filed in a contracting state, subsequent applications filed in other contracting states within 12 months will be regarded as if they were filed on the same date as the first application) might prejudicially operate against Indian inventors who might find themselves preempted by applications filed by foreigners in other contracting states. It was, however, felt that the right of priority was based on pragmatic considerations and the practical impossibility of filing simultaneous applications in several countries, and it was noted that the Patents Act of 1970, s. 135, recognizes the principle. It was also noted that, moreover, in all such cases even at present the publication of the invention outside India will amount to anticipation depriving it of novelty for the grant of patent in India: Ss. 25(1) (b) (ii); 64(1) (e), (f). Any true element of novelty and innovativeness are not in reality undermined by the priority provisions. In fact, the priority provisions only tend to discourage research devoid of any originality.

If we accede to the Convention, it was pointed out, the municipal law will continue to govern patentability, terms of protection, exclusive rights, and every other incident of patent protection in our country. For example, at present we grant only *process* patents for pharmaceutical inventions and do not grant pharmaceutical *product* patents. Even after joining the Paris Convention, if we so choose, we may deny patent protection for pharmaceutical inventions entirely, *product as well as process*.

It was noted that at this stage of industrial and technological development of the developing countries, the share of developing countries in the total world patents is bound to be small and share of foreigners in the patents granted by these countries is bound to be large. This situation will not be affected by joining or not

joining the Paris Convention. In the circumstances, the thrust of our patent law should be 'to secure that the inventions are worked in India on a commercial scale and to the fullest extent that is reasonably practicable without undue delay' Section 83 makes this clear. The Patents Act, 1970, attempts to secure this objective by provisions for compulsory licensing and revocation for non-working. The act also provides for revocation of patents in public interest. The Act also contains provisions empowering the Central Government to use inventions for the purposes of government and to acquire inventions and patents for a public purpose.

It was generally felt that these provisions do not fall foul of the Convention. The Convention allows a contracting state to make legislative provisions for the grant of compulsory licences to prevent abuses which might result from the exclusive rights conferred by the patent. For example, the Convention permits forfeiture or revocation of a patent only in cases where the grant of compulsory licences would not have been sufficient to prevent the abuses which might result from the exercise of the exclusive rights conferred by the patent, for example, failure to work, and that too only after the expiration of two years from the grant of first compulsory licence. Provisions in our Patents Act for revocation on the ground of non-working conforms to the Convention. But revocation in public interest provided for by s. 66 is of a different genre altogether and deals with a situation not contemplated or provided for by the Convention. It was felt that accession to the Convention would not entail any need to substantially amend these provisions.

Some expressed apprehension that the Convention provision [Article 5, section A(1)] that importation by the patentee into the country where the patent has been granted of articles manufactured in any of the countries of the Union shall not entail forfeiture of the patent, would lead to foreign monopoly of imports of

such articles. It was, however, felt that this fear was not well-founded. First, our Act does not provide for forfeiture in any such case. Secondly, no such imports can be made by the patentee without an import licence which is entirely within the power of the government to grant or refuse.

The argument against accession seems to assume that the Indian Act contains features irreconcilable with the Convention which have the salutary effect of deterring foreign inventors from seeking patents in India, thus leaving Indian entrepreneurs free to copy, adapt and modify foreign inventions and that this advantage will be lost the moment we accede to the Convention and remove repugnant provisions from our Act, thus opening the flood-gates for foreign inventors. It was felt that the very premise of this argument is unsound.

Several advantages accruing to our country from joining the Paris Convention were highlighted by several speakers — advantages such as strengthening technology information base, facilitating technology transfer flows by creating suitable atmosphere and generating confidence in foreign technology supplier, promotion of South-South cooperation, better influencing the revision process of the Paris Convention from inside, etc. It was underscored that India as the chairperson of the NAM and as the leader of the group of '77' can very significantly influence the process and outcome of revision of the convention by joining it and thereby working for revision from within.

As a result of the deliberations, the consensus that emerged was that in an over-all perspective, it will certainly be in the interest of the country to be party to international regime of the Paris Convention. This consensus was buttressed by the needs, objectives and aspirations expressed in the Seventh Five Year Plan.

Agreements for transfer of technology to manufacture phosphamidon and DDVP

The National Research Development Corporation of India signed agreements with the National Organic Chemical Industries Limited (NOCIL), Bombay, on 13 May 1986, for transfer of technology for the manufacture of (i) technical phosphamidon and its formulation, and (ii) 2,2-dichlorovinyl-dimethyl-phosphate (DDVP) and its formulation.

The technology for technical phosphamidon and its formulation has been developed at the Regional Research Laboratories at Jorhat and Hyderabad while the technology for DDVP and its formulation has been developed by the Regional Research Laboratory, Hyderabad.

Phosphamidon is a systemic pesticide and is translocated through both the leaves and roots. Highly water soluble and of appreciable stability, it is also non-corrosive and has low toxicity. The pesticide can be used for rice, cotton, almonds, and for vegetables like tomatoes, cauliflower, potatoes and cucumbers. DDVP is an organo-phosphorus pesticide which is highly toxic to insects. It can be used as

a household and public health fumigant against mosquitoes and for crop protection against sucking and leaf mining insects such as cockroaches, ants, flies, etc. The agreements cover process know-how and basic design engineering packages for the manufacture of these two pesticides as also the know-how relating to toxicological characterization and their control.

The manufacture of these pesticides is to be taken up by NOCIL at its plant at Lote Parshuram Industrial Area, District Ratnagiri, Maharashtra — a notified backward area. The total investment envisaged is Rs 4.50 crore for both the products while the value of annual production is expected to be around Rs 7.50 crore at full capacity.

It is expected that commercial production of these pesticides, which would commence in early 1988, would contribute considerably in protecting valuable cash crops. □

ICMA Special Citation to IIP

Dr R. Krishna, Director, Indian Institute of Petroleum (IIP), Dehra Dun, received,

on behalf of IIP, the special citation from the Indian Chemical Manufacturers Association (ICMA) at a special function organized by ICMA at Bombay in appreciation of the contributions made by IIP and the Engineers India Ltd jointly in setting up the largest benzene plant in India at the Bharat Petroleum Corporation Ltd (BPCL), Bombay. BPCL acquired unique status by adopting the indigenous technology in petroleum processing involving complicated processes and engineering in high investment project for the production of aromatics. [See *CSIR News*, 36, (1986), 14].

CITATION

The Indian Institute of Petroleum, Dehra Dun, have successfully developed the basic know-how for extraction of aromatics from reformed naphtha. They have used an efficient solvent and have imaginatively used their expertise in producing simultaneously raffinate naphtha conforming to rigid specifications. The IIP have, effectively interacted with the Engineers India Limited and the Bharat Petroleum Corporation Limited in ensuring successful transfer of technology.

The Indian Chemical Manufacturers Association recognises the contribution made by the Indian Institute of Petroleum, Dehra Dun in successfully developing technology in this high impact area. □



Dr R. Krishna, Director, IIP, speaking at the function organized by ICMA. IIP received at the function special citation from ICMA for its contributions in setting up the largest benzene plant in India

PID designated as National/Regional Node of APINMAP

The Asian and Pacific Information Network on Medicinal and Aromatic Plants (APINMAP) is the outcome of efforts of UNESCO for setting up linkages between the potential information centres amongst the developing countries for exchange of S & T information towards achieving all round scientific advancement. The UNESCO's General Information Programme, which covers many such countries in the Asian and Pacific Region, aims

at establishing networks for exchange of S & T information. ASTINFO, as it is now known, is mainly concerned with identifying such countries which possess the required data for sharing, and providing facilities for such exchange of information.

PID, by virtue of its involvement in the *Medicinal & Aromatic Plants Information Service* (MAPIS) since 1976, has been identified by UNESCO as one of the potential information centres and has been designated as one of the National/Regional nodes to be linked with APINMAP. This recognition implies that PID will be extending the information services pertaining medicinal and aromatic plants to the countries covered by APINMAP.

PID has been provided with generous grants by UNESCO under its participation and regular programme for carrying out this assignment by mechanizing the existing database. A national committee involving plant based laboratories of the CSIR and others engaged in the research work relating to medicinal and aromatic plants will be constituted by PID to advise in the matters relating to this international project. □

Housing Department, Government of Maharashtra, lauded the yeoman service of NEERI in the sphere of environmental research and development activities, and emphasized the need for a continuous programme of educating the people about pollution and environmental protection.

Shri K.R. Bulusu, Acting Director, NEERI, recounted the foundation of NEERI (erstwhile CIPHERI) on 8 April 1958 and its continuous efforts to attain excellence in its R & D activities. He assured that NEERI will intensify the planning and control of research programmes so that the fruits of research reach the commonman and industries.

Shri V.P. Thergaonkar of NEERI gave a talk in Marathi on NEERI which was broadcast by All India Radio, Nagpur, on 8 April. □

World Environment Day Celebrations at NEERI and PID

As in the previous years, the National Environmental Engineering Research Institute (NEERI), Nagpur and the Publications & Information Directorate, New Delhi, celebrated the World Environment Day on 5 June.

Celebrations at NEERI

The celebrations at NEERI included (i) a quiz contest, (ii) release of four NEERI publications, (iii) a film show on 'Down to Earth' and (iv) a colourful poster competition. The four publications released are: *Sanitation for Rural India*, *NEERI in the Service of Uttar Pradesh* (in English and Hindi) and *NEERI Annual Report: 1985-86*.

Addressing the gathering, Shri M.Y. Bodhankar, Resident Editor, *The Hitavada*, said that voice of reason should prevail to ensure a clean and peaceful environment. He called upon people to strengthen the movements for protection of environment. He commended the efforts of NEERI in promoting environmental consciousness in the young generation by organizing quiz and poster competitions.

Dr (Smt.) A.S. Gadkari and Shri A. Ghosh of NEERI spoke on the World Environment Day theme 'Environment and Peace'.

NEERI Celebrates its Foundation Day

The National Environmental Engineering Research Institute (NEERI), Nagpur, celebrated its Foundation Day on 8 April 1986. The celebrations included: A citizens' debate on 'Stringent pollution control measures would alone ensure clean environment', and a slogan contest on 'Environment'. Also, two publications of NEERI were released on the occasion: (i) *NEERI Features* containing popular science articles published during the last one year in newspapers in English, Hindi and Marathi, and (ii) a bibliography on *Environmental aspects of petroleum industry with special reference to refineries*.

Speaking on the occasion, Shri P.V. Kamat, Chief Engineer, Public Works &



Shri M.Y. Bodhankar, Resident Editor, *The Hitavada*, being shown the prize-winning posters at NEERI



Prof. H.Y. Mohan Ram watering the sapling of sandalwood after planting it in the PID compound

Celebrations at PID

At PID, Prof. H.Y. Mohan Ram of Delhi University was the Chief Guest. He planted a sapling of sandalwood (*Santalum album* Linn) in the PID compound to mark the occasion, and later gave a talk on 'Trees and Environment' in which he emphasized the role of native and exotic flora not only in preserving the environment but also in rural upliftment with their varied economic uses.

Dr Ashok Jain, Director, National Institute of Science, Technology & Development Studies, New Delhi, introduced the Chief Guest to the audience. Shri S.P. Ambasta, Editor-in-Chief, PID, spoke of Dr Mohan Ram's commitment to environmental preservation and floristic conservation. Prof. Mohan Ram embellished his lecture with a series of colour slides. □

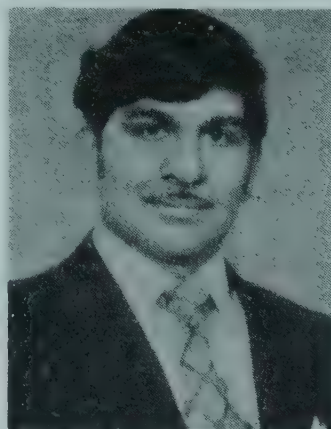
Energetics and Modelling in Aquaculture

Bhatnagar Prize-winner Dr Pandian's Work

Prof. Pandian is the first Indian to study the energy transformation in poikilotherms. In animals, a fraction of food energy is transformed to growth and metabolism. Metabolism is easily measurable but drastically fluctuates following feeding and activity. Prof. Pandian has undertaken painstaking long-term culture experiments to measure energy input process and growth in several poikilothermic animals, especially fishes and prawns. Realizing the tedium of the calorimetric and gravimetric procedures followed for the measurement of energetic components, he developed for the first time prediction models to describe energetic components. His models have eliminated the need for long-term experiments and have helped us to precisely predict the levels of energy intake and

growth processes in fishes and frogs, moths and butterflies.

Another bioenergetic component that



requires prediction is the digestibility of food by poikilotherms. As faeces of aquatic animals are rapidly soluble and decomposable, the process of its recovery and quantification is incomplete and inaccurate. His model using nitrogen as predictor of digestive efficiency holds good for most aquatic poikilotherms. In view of the transpiratory loss of water, he added water as a co-predictor to predict

the digestive efficiency of terrestrial poikilotherms.

Introducing a new design of experiment, he showed the need for rearing juvenile air-breathing fishes in shallow waters. He developed an incubator for hatching prawn and lobster eggs. The introduction of the incubator relieved the hen from the task of incubation and helped it to produce 3-4 times more eggs, the relieved prawns produced 2 times more eggs. He also showed that eye-stalk ablation technique doubles the growth efficiency and trebles the egg output in a river prawn. Experimental studies on energetics of domestic animals during 19th century have dignified the calling of animal husbandry and have given the farmers an intellectual backdrop. Dr Pandian's objective is to contribute a parallel energetic studies for poikilotherms so that aquaculture would become a dignified profession.

The very first publication of Dr Pandian representing a part of his doctoral dissertation at the University of Madras was recognized as a 'Citation Classic' by the Institute for Scientific Information, Philadelphia. He continues to make significant contribution in collaboration with

Dr. T.J. Pandian, Madurai Kamaraj University, Madurai, has been awarded the 1984 Shanti Swarup Bhatnagar Prize in biological sciences (along with Dr. K.R.K. Easwaran, Indian Institute of Science, Bangalore) [CSIR News 36 (1986), 29]

his students, among whom special mention may be made of Dr M.P. Marian, S. Mathavan, J. Muthukrishnan, A.G. Poniah and E. Vivekanandan.

Dr Pandian (born 15 June 1939) received his school education in Madurai and obtained M.Sc. in Zoology from the University of Madras in 1960 securing first rank and a medal. He was awarded Ph.D. by the Madras University for his work on 'Fish energetics' in 1965. Subsequently, he worked with Prof. O. Kinne on 'Energetics of Marine Animals' and received Dr ret. nat. degree from the University of Kiel, FRG, in 1968. He was a Lecturer at Bangalore (1968-71) and subsequently a Reader at Madurai (1971-77), where he was offered a chair in 1978. In recognition of his outstanding contributions to 'bioenergetics as applied to fish production', Indian Agricultural Research Institute, New Delhi, awarded him the Hooker Prize in 1979. He was a Visiting Scientist/Professor at Oxford (1973), Columbia, USA (1981-82), Norway (1985), a Visiting Scientist to the Institute of Ecology, FRG (1966-68) and the UGC National Lecturer (1985-86). He is an elected Fellow of the Indian Academy of Sciences and Fellow of the National Academy of Sciences, India. Under his supervision, more than 18 students have obtained Ph.D. degrees from the Bangalore and Madurai universities. He has published more than 100 research papers, has contributed more than 6 chapters to books published abroad and has just completed the editorial work for a two-volume book series on *Animal Energetics* to be published by Academic Press, New York. □

PERSONNEL NEWS

Appointments/Promotions

At the Regional Research Laboratory (RRL), Jammu, the following have been promoted, on assessment, with effect from the dates given in parentheses:

As Scientist C

Dr S.C. Taneja (3 May 1985), Dr P.G. Rao (21 May 1985), Dr D.K. Choudhary (24 Oct. 1985), Shri R.K. Malhotra (11 Nov.

1985), Shri M.L. Sharma, Dr (Smt) P. Somal, Dr V.K. Vakhlu, Dr S.K. Choudhary, Dr G.K. Gupta, Dr K.A. Suri, Dr Charan Singh, Shri S.S. Balyan, Shri R.P. Singh, Dr J.L. Suri, Shri S.D. Sharma, Dr Ramesh Kapoor, Dr V. George, Shri Swadesh Pal, Dr P.N. Pandita and Shri V.S. Gandotra (all the sixteen from 1 Feb. 1986).

As Technical Officer C

Shri D.K. Sultan and Shri B.M. Gandotra (both from 1 Feb. 1986).

As Mechanical Engineer C

Shri C. Nainar (16 June 1985).

As Library Officer C

Shri D.V. Rawal (1 Feb. 1986).

Honours & Awards

Dr Paul Ratnasamy gets VASVIK award

Dr Paul Ratnasamy, Head, Inorganic Chemistry Division, National Chemical Laboratory (NCL), Pune, has been awarded the prestigious 'VASVIK Award for Chemical Sciences and Technology', instituted by the Vividhlaxi Audyogik Samshodhan Vikas Kendra (VASVIK), Bombay, for the year 1982. The award carries a cash prize of Rs 25,000, a gold medal and citation. For an account of Dr Ratnasamy's contributions see *CSIR News*, 36 (1986), 44.

Dr G. Thyagarajan

Dr G. Thyagarajan, Director, Central Leather Research Institute (CLRI), Madras, has been nominated a member of an expert group constituted by the Ministry of Industry, Government of India, to undertake in-depth study on the need and continued use and manufacture of Phosgene and MIC-based pesticides, chemicals, etc.

Dr Thyagarajan has also been nominated Convener of the Sub-committee of Plant Safety and Process Hazards, constituted under the Development Council for Chemical Industry. This is one of the four sub-committees to make recommendations for production, coordinate production programmes and review progress of the chemical industries from time to time.

Dr S.K. Tandon

Dr S.K. Tandon, Assistant Director, Industrial Toxicology Research Centre (ITRC), Lucknow, has been awarded the degree of Doctor of Science in Chemistry (Che-



Dr. Paul Ratnasamy receiving the VASVIK Award at the hands of Dr. Shankar Dayal Sharma, Governor of Maharashtra

mical Toxicology) on the dissertation entitled 'Studies on toxicity and chelation of certain metals and chemistry of some bioactive compounds' submitted to the Lucknow University, in 1984. His work includes study of organometallic chemistry of silicon, germanium and tin and toxicology of lead, cadmium, mercury, chromium, manganese, nickel, thorium, etc. It also includes the chemistry of certain heterocyclic systems of medicinal interest. □

OBITUARY

Dr V. Chalpati Rao

Dr V. Chalpati Rao, former Scientist & Head of the National Environmental Engineering Research Institute's Virology Cell passed away after a sudden heart attack at Houston, Texas, USA on 5 July 1986. □

PATENTS FILED

1005/DEL/85: A process for the photocatalytic decomposition of water into hydrogen and oxygen, M.M.T. Khan, R.C. Bhardwaj and (Smt.) C. Bhardwaj—Central Salt & Marine Chemicals Research Institute, Bhavnagar.

1/DEL/86: A process for the manufacture of insulating bricks from rice husk ash, A.K. Roy & Arbinda De—Central Glass and Ceramic Research Institute, Calcutta.

2/DEL/86: A process for the manufacture of high alumina refractory bricks from sillimanite beach sand, A.K. Roy — Central Glass and Ceramic Research Institute, Calcutta.

916/DEL/85: Improvements in or relating to the extraction of nickel from lateritic nickel ores, L.B. Sukla and R.P. Das—Regional Research Laboratory, Bhubaneswar.

1055/DEL/85: A method of cooling a device such as a turbine blade or a cylinder and a device therefor, B.R. Pai—National Aeronautical Laboratory, Bangalore.

1124/DEL/85: A process for deposition of amorphous silicon film by glow discharge decomposition of silane in

cascade reactors, P.N. Dixit, R. Bhattacharyya, O.S. Panwar & V.V. Shah—National Physical Laboratory, New Delhi.

1133/DEL/85: Process for the preparation of a stabilizer to inhibit autocatalytic decomposition of hydrogen peroxide in sulphuric acid-peroxide mixture containing metal ions produced during bright dipping and etching of copper & copper based material, D.D.N. Singh—National Metallurgical Laboratory, Jamshedpur.

90/DEL/86: An improved rotating biological rope contactor for the treatment of biodegradable wastes, A.S. Bal, A.N. Khan, H.J. Patil and A.C. Manual—National Environmental Engineering Research Institute, Nagpur.

109/DEL/86: An improved process for the preparation of codeine from morphine, N.R. Ayyangar, A.R. Choudhary, U.R. Kalkote & V.K. Sharma—National Chemical Laboratory, Pune.

1033/DEL/85: Process for preparation of nitro-potassic fertilizers and technical grade potassium nitrate from mixed salt, V.P. Mohandas, S.J. Gohil, J.M. Joshi, J.R. Sanghavi & M.M.T. Khan—Central Salt & Marine Chemicals Research Institute, Bhavnagar.

1126/DEL/85: Process for the preparation of geraniol based saturated diethers useful as new insect control agents, S.A. Patwardhan, R.N. Sharma, A.P. Phandnis, P.D. Gund & I.V. Bhaladar—National Chemical Laboratory, Pune.

227/DEL/86: Improvements in or relating to the manufacture of roof covers, K.K. Verma, Navin Chand, A.C. Khazanchi & P.K. Rohtagi—Regional Research Laboratory, Bhopal.

280/DEL/86: An improved process of degassing of aluminium and its alloys, G.S. Sivaramakrishnan, R. K. Mahanti & R. Kumar—National Metallurgical Laboratory, Jamshedpur.

ANNOUNCEMENTS

International Workshop on Homogeneous Catalysis

The Central Salt & Marine Chemicals Research Institute, Bhavnagar, is organiz-

ing an International Workshop on Homogeneous Catalysis — Activation of Molecular Oxygen and Catalysed Oxidations by Dioxygen Complexes during 3-6 October 1986. This workshop will provide a forum for exchange of information and R&D efforts made world over in this emerging field of research. The following topics will be covered: Novel dioxygen complexes of metal ions: synthesis, structure, equilibrium studies, kinetics of metal-dioxygen complexes formation; Oxidations catalyzed by metal-dioxygen complexes; and Oxidations catalyzed by metal-peroxo and metal-oxo complexes. Plenary lectures and sessional keynote addresses will be by invitation. The papers received for presentation by the participants will be displayed and discussed in poster sessions.

Further details regarding the workshop can be had from: Prof. M.M. Taqui Khan, Chairman, Organizing Committee, International Workshop on Homogeneous Catalysis, Central Salt & Marine Chemicals Research Institute, Bhavnagar 364 002.

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Third National Symposium on Ultrasonics (NSU-III)

The Ultrasonic Society of India, in collaboration with the National Physical Laboratory, New Delhi, is organizing the Third National Symposium on Ultrasonics (NSU-III) on 25-26 September 1986. The symposium will cover the following topics: Ultrasonic instruments and devices/transducers; Medical and biological ultrasonics; Standardization and characterization; High power ultrasonics; Ultrasonic non-destructive testing; Physics of ultrasonics: propagation, relaxation, etc.; Underwater ultrasonics; Imaging; SAW devices and delay lines; Transducer materials; and General.

Further details relating to the symposium can be had from: The Convenor (Dr V.R. Singh/Dr Janardan Singh), National Physical Laboratory, Hillside Road, New Delhi 110 012. □

CSIR NEWS



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SALT IODIZATION PLANT AT KICHCHA VILLAGE

National Seminar on Building Construction Management

Dr R.K. Bhandari's Address

While inaugurating a national seminar on Building Construction Management, at the invitation of the Indian Society for Industrial Management Development, at Hyderabad on 12 June 1986, Dr R.K. Bhandari, Director, Central Building Research Institute (CBRI), Roorkee, said that the greatest challenge in the field of construction management research lies in evolving a strategy to ensure completion of projects on schedule, minimization of escalation costs on contract and minimum standards of quality. The country spends half the plan outlay on construction, and buildings for residential, industrial, commercial, administration, educational, and entertainment account for half of this expenditure. The construction programmes are inter-woven in all sectors of economy and in order to achieve plan targets it is imperative that we promote indigenous technology, sav-

ing of scarce materials, utilization of wastes, energy conservation and environmental preservation. CBRI has done considerable work on cost reduction in building. Project planning, evolution of scientific norms and standards, mass production of precast components, ensuring of material quality, elemental cost analysis, search for economical specifications and efficacy of different contracting systems have received the institute's major attention. A manual for efficient management of building projects has been written. The time and methods study conducted at the institute has led to the drafting of IS: 7272 Part I-1974 on recommendations for labour output constants for building work. Comparative performance of different contracting systems has been studied in quantitative terms and a handbook on building economics and productivity has been prepared for

planners, engineers, surveyors and scientists.

CBRI has developed a number of precast flooring and roofing systems. Its brick panel system saves 33% in concrete and 28% in overall cost. Over 28,000 houses in Punjab, 4000 houses in Haryana, 3500 houses in Ghaziabad, 2001 houses in Noida and 1000 houses in Srikakulam have been built with brick panels. Yet another technology of R.C. planks and joists saves 27% in concrete, 14% in steel and 20% in overall cost. Nearly 20,000 houses have been built using this technology in Andhra Pradesh and many more elsewhere in the country.

Dr Bhandari laid emphasis on safety in construction, pointing to the need for more scientific design of scaffolding. He pointed out that nearly 200 highrise buildings in Delhi are potential fire hazards, and that CBRI has all the expertise on fire protection in buildings.

He focussed the attention on the modern trends of designing buildings for 'zero defect', 'zero maintenance' and 'zero risk'. In more developed countries with scarcity of manpower, the trends are towards development of technologies deploying 'zero manpower' using robots. For many more years, however, the technology in India must provide a happy balance between man and machine. Computer is being increasingly used in construction management and the software packages to meet the complexity of situations deserve to be expeditiously developed.

One of the most challenging jobs that the engineers face today is with respect to demolition of tall structures and their reconstruction. Appropriate technologies for demolition, for assessment of the integrity of existing foundation systems and for recycling of debris need to be developed. The modern trends are to make increasing use of laser for breaking of concrete because concrete possesses low thermal conductivity and laser beams are naturally effective in demolition of concrete structures, Dr Bhandari added.



The CBRI Director Dr R.K. Bhandari (centre) attending the National Seminar on Building Construction Management held at Hyderabad

Colour TV Technology Transferred to AMTRON

The National Research Development Corporation of India has entered into an agreement with the Assam Electronics Development Corporation Limited (AMTRON), Guwahati, on transfer of the complete technology for the manufacture of colour TV receivers. The agreement was signed between NRDC and AMTRON at Guwahati on 12 July 1986.

The colour TV receivers bearing the brand name of AMTRON, that will roll out of the Guwahati factory, were originally designed by the Central Electronics Engineering Research Institute (CEERI), Pilani, and then productionized by the public sector company, Central Electronics Limited (CEL), Sahibabad, U.P.

NRDC has retained the services of CEL to provide AMTRON with a comprehensive package covering: production technology, plant engineering, training and technical assistance. Thus, the core know-how package is well supported by all necessary additional industrial inputs needed for ensuring the success of the new venture.

With the number of TV transmitters in the north-east scheduled to increase from the present 10 to 20 by March 1988, the region is poised for a steep increase in demand for TV receivers in the near future. The technology being acquired now will enable AMTRON to cash in on this increase and provide the region with a quality product. □

CEERI gets ELCINA Award—1985

As a part of its modernization programme for sugar industry, the Central Electronics Engineering Research Institute (CEERI), Pilani, undertook the development of electronic process control instrumentation

For details of the CEERI efforts towards modernization of sugar industry see the feature article 'Modernization of Sugar Industry Through Application of Electronic Systems: CEERI's Contributions', *CSIR News*, 36 (1986), 70.



Dr Abid Hussain, Member, Planning Commission, giving away ELCINA award.

for juice clarification and pan boiling stages of the sugar industry, as a research programme funded by the Department of Electronics.

Technical know-how on the equipment: (1) Automatic liming and pH control system for continuous juice sulphitation stage; and (2) Panometer, a novel AC resistivity measuring equipment for pan boiling stage was transferred to industry. CEERI trained the engineers of the firm in assimilating and absorbing the technology and brought them to a level where they could adapt themselves to the emerging needs of the sugar industry.

CEERI collaborators have successfully commercialized the technology and the equipment has been installed in about 45 sugar factories where it is working satisfactorily and to the advantage of the users.

This has built up confidence and credibility in indigenous technology, and at the same time demonstrated how electronics can play a major role in improving the process efficiency and control in the sugar industry.

The Electronic Component Industries Association of India has adjudged this work as an outstanding R&D effort and has announced ELCINA 1985 award for this work.

Dr Abid Hussain, Member, Planning Commission, gave away the award in a

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ceremonial function held in Delhi on 22 May 1986. Shri L.N. Chaudhary and Dr Pawan Kapoor, Scientists, CEERI, received the award jointly with Shri Mohan Bhardwaj of the Satwik Electric Controls Pvt. Ltd, Nasik, the collaborating firm. □

CITATION

The ELCINA Award for outstanding work in Research & Development for 1985 is given jointly to Messrs Central Electronics Engineering Research Institute (CEERI), Pilani, for doing pioneering work in electronic instrumentation for sugar industry with the R&D support provided by Department of Electronics under the Technology Development Council (TDC) Programme and to Messrs Satwik Electric Controls Pvt. Ltd, Nasik, to whom the know-how has been transferred, for successfully carrying out the product engineering of two of the electronic units, namely, pH control system and panometer and introducing those in a significant way in sugar industry for increasing its productivity. Particularly noteworthy are the systematic efforts made by CEERI, Pilani, to develop various electronic systems to suit the needs of local sugar industry by continuously interacting with them to understand their requirements on one hand and on the other, increasing their awareness and receptivity to such electronic instrumentation through training programmes and seminars and carrying out extensive field trials in sugar mills to prove these systems. □

Discovery of a new kimberlite

Under a UNDP-aided project aimed at establishing methods and techniques for exploration, the National Geophysical Research Institute (NGRI), Hyderabad's scientists have discovered a new kimberlite, a rock type which is the primary

source of diamonds, at about 10 km east of Lattavaram ($16^{\circ} 56'N$, $77^{\circ} 23'E$), in the Anantapur district of Andhra Pradesh. Only six kimberlites were known in the Wajrakarur-Lattavaram area in Andhra Pradesh, although many diamond finds have been reported from the soil in the area. The last discovery of a kimberlite about 15 years ago by the Geological Survey of India was based on geophysical investigations. The present discovery is a result of the application of stream sediment sampling technique in search of mineral grains from a kimberlite. The NGRI scientists, with the help of a UNDP consultant, developed heavy mineral concentration and identification procedures and, combining these with careful sampling strategies, were able to detect indicator mineral grains in stream samples even 3 or 4 km down stream from some of the known kimberlites. Sampling a few streams north of Penner river, they came across one pyrope rich garnet, about 900μ across, in a 60 kg sample in one of these streams. Sampling up stream from this point, they were led to a location where three

important kimberlite indicator minerals, viz. pyrope garnet, chrome diopside and picroilmenite, were found in large numbers. Closer stream sampling in combination with loam sampling in a grid pattern finally led to the site of the present discovery.

The size and shape of this kimberlite was established by drilling and trenching. The kimberlite ($450 \times 25m$) was found by the Geological Survey of India to be diamondiferous. A gem quality diamond piece (8 mg) was found by processing only 3 tonnes of the kimberlite material.

The present discovery has changed a long held opinion that stream sediment sampling would not work in this region in locating kimberlites. Application of the methodology now developed, with appropriate sampling strategies, holds great promise for finding more kimberlites in this region. The NGRI scientists — D. Guptasarma, T.R.K. Chetty, D.S.N. Murthy, A.V. Ramana Rao and B. Venkatanarayana, and the UNDP consultant N. Baker, have reported this finding in the March issue of the *Journal of the Geological Society of India*. □



A gem quality diamond piece (8 mg) found in a new kimberlite, discovered recently by NGRI scientists

NCL receives 'Special ICMA Citations' for two of its innovative technologies

At a function held on 26 April 1986 in Bombay, the Indian Chemical Manufacturers Association (ICMA) conferred the ICMA Award for Forward Development of Technology for 1985 on Indian Petrochemicals Corporation Ltd., Vadodara. IPCL received this award for achieving the unique breakthrough in the complex area of isomerization of xylenes involving novel catalyst, Encilite-1, developed jointly by the National Chemical Laboratory (NCL), Pune, and the Associated Cement Companies (ACC) Ltd, Bombay. Encilite-1 is a high-silica catalyst capable of making the C-8 feedstock obtained from the naphtha reformer yield, a product rich in *p*-xylene, a high volume raw material used in polyester fibre manufacture. Encilite-1 is at least equivalent to the ZSM-5 catalyst used in many countries and, in some respects, even superior to it. The catalyst has been successfully tested in a commercial reactor in IPCL for several months and commercial production of xylenes using the catalyst has been started. IPCL has planned

the expansion of its xylene production facility and the cost of the 100,000 tonnes/annum plant, which it plans to establish, is expected to be Rs 1000 million. In

THE ICMA AWARD—1985

SPECIAL CITATION TO NATIONAL CHEMICAL LABORATORY, PUNE

The National Chemical Laboratory, Pune, have secured an astounding success in inventing a highly original catalyst for isomerisation of xylene, containing ethyl benzene. This development calls for very high level scientific inputs from diverse areas. They have successfully interacted with The Associated Cement Companies Limited and the Indian Petrochemicals Corporation Limited in transferring this complex technology in a record period.

The Indian Chemical Manufacturers Association recognises the successful penetration of the National Chemical Laboratory into this frontier high-tech area of world class and compliments the joint endeavours. □

THE SIR P.C. RAY AWARD—1985

SPECIAL CITATION TO NATIONAL CHEMICAL LABORATORY, PUNE

The National Chemical Laboratory, Pune, have demonstrated, once again, their capabilities in developing know-how for complicated organic chemical processes. The manufacture of Ethylenediamine and Polyethyleneamines entails high pressures and encounters severe corrosive conditions.

The Indian Chemical Manufacturers Association recognises the valuable contributions made by the NCL in this fine endeavour and its efforts in the successful transfer of technology to Diamines and Chemicals Limited, Ahmedabad. □

out on a laboratory scale at NCL and on a pilot plant scale at DACL. For every tonne of EDA about 80 kg of higher (poly) amines are obtained. The product distribution can be varied in favour of polyethylene amines, if necessary. The engineering of the commercial plant was carried out by the Metallurgical Design Company Pvt. Ltd. DACL plans to increase its production capacity for the amines, which is at present 1500 tonnes to 2000 tonnes/annum, with NCL acting as its consultant. □

Synthetic fatliquors — New approach by CLRI

A new approach has been made by the Central Leather Research Institute, Madras, for the preparation of synthetic fatliquors by oxidizing the long linear chain paraffins at elevated temperatures, using suitable catalysts. The oxyderivatives with the reactive carbonyl, ester and hydroxyl groups are suitably reacted with long chain alcohols, diols and alkanolamines to obtain nonionic products which are further subjected to sulphonation, sulphonation, sulphonmethylation and quaternization to obtain a series of ionic (anionic and cationic) water dispersible products for their use as fatliquors in leather industry. The fatty copolymers prepared by reacting the fatliquors with the acrylic monomers are highly advantageous (finding their application as retanning cum fatliquoring agents) in imparting fullness in addition to the feel characteristics to the leathers in one single operation. The leathers treated with the developed fatliquors are quite comparable in respect of feel and strength properties with the leathers treated with market products. The special features of the new approach are: (1) simple and easy processing, and (2) economical with the use of stainless reactors and noncorrosive and nonpolluting source of reactants. However, there is slight rancid odour in the present fatliquor and work is in progress to eliminate the same. □

recognition of its remarkable achievement and of its success in transferring the technology to IPCL jointly with ACC, NCL received a special ICMA citation.

ICMA also conferred the Sir P.C. Ray Award for Development of Indigenous Technology for 1985 on Diamines & Chemicals Limited (DACL), Vadodara, for its pioneering the manufacture of ethylenediamine (EDA) and polyethyleneamines. NCL received a special citation for the successful transfer of its technology for the manufacture of these amines to DACL. EDA is an important raw material/intermediate used in the manufacture of textile auxiliaries, chelating agents, photographic chemicals and scores of other products. The indigenous NCL technology, starting from ethylene dichloride and ammonia, was worked

Plant for production of iodized salt commissioned at Kichcha village

A plant for the production of iodized salt, based on the technology developed by the Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, and costing Rs 14 lakh, was switched on by the Union Minister of Industry, Shri Narain Dutt Tiwari, at Kichcha village in Nainital District.

Iodized salt produced by this plant has uniform iodine coating and is more stable. The plant will produce 36,000 tonnes of iodized salt/annum. It has provision for another 36,000 tonnes capacity by a second shift working. With the commissioning of this plant, CSMCRI has given a technology to the nation for combating goitre. The technology, based on the submersion process, was transferred by CSMCRI on turn-key basis. The process cost of iodization would work out at Rs 35/tonne.

About 170 million population is exposed to endemic goitre at present. By 2000 A.D. the population to be protected against goitre in our country may well be

around 200 million. Combating goitre is a mission oriented programme of the Government of India.

On the basis of the computation that each individual requires about 5 kg salt a year, a single plant of capacity 36,000 tonnes (standard plant considered by Nutrition Foundation of India) can provide iodized salt for nearly 7 million people. Allowing for population increase in the next one and half decade, the country needs 30 such plants. CSMCRI can install iodization plants in various capacities from a cottage scale ranging from 10-100 kg (labour oriented) to the 125 tonnes (mechanized)/day.

The know-how of the process is being supplied free of cost by CSMCRI, and is approved by the Government of India. So far the institute has released the process to about 51 parties all over the country.

The Government of India has taken up effective measures for prevention and control of goitre and elimination of birth of mentally retarded children of goitre

affected mothers in the entire country; particularly in U.P. As it intends to iodize all the edible salt production, the Government has liberalized issuing of licences for the manufacture of iodized salt after taking clearance from the Salt Commissioner. □

Lubricative peptides from waste protein of animal origin

A large quantity of waste proteins available in the form of trimmings and fleshings is obtained during tanning operations. These waste proteins can be put to better utilization by converting them into valuable byproducts. At the Central Leather Research Institute, Madras, the waste trimmings and fleshings were reacted with alkanolamines by transamidification and converted to low mole-weight aminol peptides. Further reaction with fatty acids, fatty acid esters, and oils resulted in fatty aminol peptides. The tanned leathers treated with fatty aminol peptides were found to be much fuller and suppler than the leathers treated with oil products alone. Thus, a method has been standardized for the better utilization of tannery waste products, for getting quality leathers. □

Daylight phosphor plant commences trial production

The Sonai Electrochemicals, Thirumanagalam, commenced trial production of calcium halophosphate daylight phosphor based on the technology developed at the Central Electrochemical Research Institute (CECRI), Karaikudi. The plant has a production capacity of 24 tonnes/ annum.

Calcium halophosphate phosphor finds application mainly in the fluorescent tube light industry. This material gives daylight colour in the tube lights. The technology developed at CECRI involves solid state reaction of high purity raw materials of fine particle size at high temperature. The advantage of this process is that good quality phosphor can be prepared without the use of special inert



Shri N.D. Tiwari, Union Minister of Industry, inaugurating the iodization plant set up at Kichcha village, based on CSMCRI technology

gas atmospheres. This is the first indigenous plant to produce daylight phosphor using indigenous raw materials. □

Microbes as bio-catalysts in treating industrial wastes

The National Environmental Engineering Research Institute (NEERI), Nagpur, has successfully demonstrated the use of microbial cultures in the treatment of toxic waste containing phenols from the coal gasification plant at the Regional Research Laboratory, Hyderabad.

The concentration of phenol which is very high in the wastewater effluent could be brought within the permissible discharge levels with the help of the microbial culture (yeast) *Candida tropicalis*.

NEERI has successfully developed the technical know-how for the micro-biological treatment of toxic industrial effluents and can supply the technical know-how for the treatment of coal carbonization industrial waste. The know-how can be obtained from NEERI on mutually agreed terms and conditions. □

Get-together on Camphor

A get-together on camphor was organized by the Central Electrochemical Research Institute (CECRI), Karaikudi, on 21 April 1986. Eighteen entrepreneurs participated in this get-together.

CECRI scientists presented a paper furnishing all the information on camphor and also the process developed at CECRI for the production of camphor from isobornyl acetate.

The CECRI process consists in conversion of isobornyl acetate to isoborneol, and indirect electrochemical oxidation of isoborneol to camphor. This scheme was sponsored by the Venkateswara Chemicals, Karur, who have put up a plant for the conversion of isobornyl acetate to isoborneol. □

Super micro-computer installed at NEERI

A CMC Impact 8640 32-bit super micro-computer with six terminals and a powerful

operating system UNIX-V has recently been installed at the National Environmental Engineering Research Institute (NEERI), Nagpur, by the Computer Maintenance Corporation (CMC) of India at a cost of Rs 13 lakh.

The computer will be used by NEERI for the Aerometric Data System of the National Air Quality Monitoring Network (NAQMN) Programme under which air quality is being monitored in ten major cities in India. The institute has also developed an on-line personnel information system for all its scientific staff by using the Data Base Management (dBase II) software. □

Synthesis of nitrogen heterocycles of biological, pesticidal and synergistic interest

As a part of continuing programme in the areas of pesticides and biologically active molecules at the Regional Research Laboratory (RRL), Hyderabad, Shri A.R. Prasad synthesized a variety of compounds, viz. benzilidineaminotriazoles, triazolothiadiazoles, triazolothiadiazines, thiazolotriazoles and benzimidazoles. Biological activity of these compounds was tested in experimental animals for their action as CNS, analgesic, anti-inflammatory and related actions. Pesticidal action was confined to the study of synergism with the fungicide, 2-methyl benzimidazolocarbamate (MBC) and insecticide, carbaryl. Some of these compounds exhibited interesting profile of activity.

Shri Prasad worked under the guidance of Dr P.B. Sattur of the laboratory and was awarded Ph.D. degree by the University of Roorkee, Roorkee. □

Toxicological studies of pesticides on albino rat *Rattus norvegicus albinus*

At the Regional Research Laboratory (RRL), Hyderabad, Km. Gundimeda Usha, a CSIR research fellow, has studied the toxicological parameters like tissue damage

by certain pesticides (both technical and formulation grades) on the albino rat *Rattus norvegicus albinus*, a non-target organism.

Phosphoric esters, plant products and synthetic pyrethroids and their formulations were tested for acute oral, dermal and inhalation toxicity to *R.n. albinus* by controlled exposure through nose-only. Of the technical grade pesticides studied, Cypermethrin-95 was highly toxic and Permasect-92 slightly toxic to rats through oral route. But, Monocrotophos-71 was extremely toxic, Phosphamidon-92 and Chloropyrifos-96 were highly toxic and Neemrich-100 was slightly toxic to rat through dermal route. Cypermethrin-95, Fenvalerate-90 and Permasect-92 were found to be moderately toxic to rats through inhalation route. Of the formulation grade pesticides studied, Cypermethrin-25 EC and Permasect-25 EC were moderately toxic, and Fenvalerate-25 EC was moderately toxic through inhalation route.

Sub-acute oral administration of pre-determined doses of Cypermethrin-25 EC (form.) and Neemrich-100 (tech.) was carried out separately as low (1.44), medium (2.88) and high (4.33 mg/kg) doses daily to albino rats for 90 days. No gross morphological or histopathological changes were found by the oral administration of sub-acute doses of Cypermethrin-25 EC in liver, kidney, intestine and heart. However, aerolar parenchymal disintegration, aspermatogenesis and interstitial edema were observed in the testis of rats administered with sub-acute high doses of Neemrich-100 orally.

Sub-acute dermal toxicity of Dodine was studied by applying three pre-determined daily doses (low: 125, medium: 250 and high: 500 mg/kg) over a shaven area of skin for 5 days/week/3 weeks. Male rats were more susceptible to Dodine than female in sub-acute trials. Reduction in the rates of food consumption and body weight during and after medication of Dodine in both male and female rats were recorded. Microscopic examination of treated skin sections revealed hyperkeratinization of epider-

mal layer, and leukocyte infiltration under the epidermis suggested that Dodine can be injurious on chronic exposure.

Sub-acute dermal toxicity study of Neemrich-100 (tech.) at daily dose levels of 200, 400 and 600 mg/kg on 5 days/week for 3 weeks carried out against albino rats revealed no overt signs of toxicity or abnormal behaviour during the treatment. Treated rats exhibited higher food consumption and gains in weight and slight scaling of the epidermis and hyperkeratosis of the stratum corneum in the skin of rats treated at the high dose rate. It is, therefore unlikely that Neemrich will present significant health hazard from skin contact under normal industrial handling conditions.

Similarly, during sub-acute dermal application of 1.6 (low), 1.8 (medium) and 2.0 (high) mg/kg/day of Phosphamidon-92 (tech.) to rat (5 days/week for 3 weeks), a reduction of food intake and of body weight was recorded with all the three treatments. Symptoms like hypersalivation and frothing were noticed in both the sexes and a relative decrease in liver weight and gross pathological alterations like ballooning degeneration in skin, occasional glomerulonephritis in kidney, emphysema in lung and active spermatogenesis in majority of tubules of testes were recorded. Alteration in tissue weight was dose dependent. Ability to survive sub-acute doses depended upon the adaptive potential of the tissue.

Sub-acute inhalation toxicity of Dodine-95 (tech.) low (0.0018), medium (0.0037) and high (0.005); Dodine-85.5 (form.) low (1.55), medium (3.13) and high (4.72); Cypermethrin-95 (tech.) low (5.95), medium (11.90) and high (17.856); Cypermethrin-25 EC (form.) low (55.55), medium (111.11) and high (166.66); Fenvalerate-90 (tech.) low (7.138), medium (14.27) and high (35.708); Fenvalerate-25 EC (form.) low (3.569), medium (7.13) and high (10.71) mg/M³/sec. was tested in the form of mist-aerosol at the rate of 6 hr/day for 14 days against albino rat through nose only. On inhaling mistaerosol of Dodine-

95 and Cypermethrin-25 EC alveolar edema, greatly distended alveoli ruptured at some places forming vesicles were observed, whereas Cypermethrin-95 caused alveoli inflammatory exudate and hyperemia in the lungs of rats. Dodine-85.5 and Fenvalerate-25 EC caused congestion of blood vessels and Fenvalerate-90 caused peribronchial lymphoid hyperplasia in the lungs of rats due to deposition of pesticide particles. Dodine-85.5 also caused interstitial edema in the testis of rats.

Km. Usha was awarded Ph.D. degree by the Osmania University, Hyderabad, for her thesis based on the study. She worked under the supervision of Dr Syed S.H. Qadri of RRL, Hyderabad. □

PROGRESS REPORTS

NGRI Annual Report: 1984-85

The annual report of the National Geophysical Research Institute (NGRI), Hyderabad, for the period 1984-85 shows that most of the ongoing research projects of the institute were restructured or started anew in January 1984 and were in the first phase of their evolution. Major achievements during the year include: development of more versatile mathematical frame-works and computer software for interpretation of geoelectromagnetic data; imaging of the subsurface geophysical structure of some prospective regions of the country as a part of collaborative/sponsored research with ONGC, GSI and OIL; and development of innovative geophysical search methodologies such as location of cavernous aquifers in Karst regions and determination of the mechanical parameters of rocks needed for designing engineering structures.

Some notable achievements, development of R&D infrastructural facilities, other important activities and significant events are:

A new versatile and efficient computer modeling program for interpretation of

electromagnetic data in terms of three dimensional buried geological conductors of elongated and tabular geometry, was successfully tested. This program enables one to model lateral variations of electrical conductivity and adds a significant computer aided interpretational tool to the repertoire of geoelectromagnetics. Another computer program for modeling and interpretation of electromagnetic response of a layered earth observed in boreholes, was developed and successfully tested. The programme is particularly designed to aid rapid and reliable interpretation of borehole e.m. data towards characterization and correlation of subsurface horizons such as those usually encountered in exploration of minerals and groundwater.

An integrated analysis of the deep seismic sounding data along four profiles across the Narmada-Son lineament generated previously was completed during the year to image the crustal structure under this enigmatic intra-continental feature of great antiquity. The results have led to the delineation of two sedimentary basins south of lineament, one of which comprises a fairly large succession of Mesozoic Gondwana sediments, about 1.7 km in thickness, beneath a 0.4 km thick layer of Deccan Traps in the Tapti Graben. The work formed a part of collaborative research with the Geological Survey of India (GSI) and the Oil & Natural Gas Commission (ONGC) towards underpinning planning strategies for resource exploration. The crustal structure underneath the Narmada-Son lineament was also studied through an independent approach using airborne magnetics, as a collaborative research project with GSI. An important outcome of this work has been the recognition of magnetic signatures of carbonatite deposits on the basis of which new carbonatite prospects have been indicated.

Interpretation of aeromagnetic data over the Cuddapah basin and the adjoining crystallines acquired in previous years under a collaborative project with GSI was completed. The results highlight the

anomalous regions that warrant more intensive investigations using ground geophysical methods. In particular, the igneous features were found to be marked by a characteristic pattern of magnetic zoning. Furthermore, the southern part of the basin which shows up a remarkable magnetic anomaly is most likely intruded by a large mafic body, indicating that the lower Cuddapah basin initially developed as a large oval depression with its major axis pointing approximately towards a NW-SE direction.

A three-dimensional interpretative model was derived for the Mahanadi basin using harmonic inversion of aeromagnetic data. This work was completed as sponsored research by ONGC with the objective of producing a first order model of the basin to illuminate its hydrocarbon potential and choice of exploration strategies. Similar modeling was also completed for the West Coast continental shelf based on the data provided by ONGC.

A total hardware and software package was developed for determining the dynamic elastic constants of rocks *in-situ*, towards parametrizing their engineering properties. This work was completed utilizing the opportunity for field investigations to assess rock quality in a sheared zone, during a research project sponsored by the Srisailem Hydroelectric Project. Determination of rock properties in different parts of the core of topographic highs, is an otherwise difficult task to perform and this experiment equips the institute with a reliable methodology to confront such problems elsewhere in the country.

Devising effective sensing capabilities of the resistivity tools, based on extensive geological mapping and marginally supported by magnetics and seismics, a few cavernous zones extending to a depth of 30 m and possibly comprising productive aquifers were located in Chilavaripalli (Anantapur Dist). These results are significant in pointing out ways to design integrated exploration for groundwater in Karstic regions which are other-

wise difficult to locate by known geophysical technologies.

Four NGRI scientists participated in the fourth Antarctica expedition and carried out multi-parameter geophysical exploration around *Dakshin Gangotri*. This work forms the first phase of a long term programme of geophysical investigations in Antarctica drawn up by the institute's scientists towards progressive development of the R&D capabilities for evolving appropriate geophysical technologies for the exploration of subglacial structure of the basement, mineralized zones and of tectonic features with increasingly higher resolution.

A major research programme aimed at determining ambient *in-situ* stresses in boreholes up to a depth of 500 m using hydraulic fracturing was initiated towards characterizing intraplate stress regimes in different segments of the Indian lithosphere. The first measurement was made in an experimental borehole drilled in the NGRI campus up to a depth of 175 m. The maximum principal stress here is found to be oriented along N 40°E ($\pm 13^\circ$), coinciding with the direction of motion of the Indian plate. Besides this application which would be applied to diverse problems, notably earthquake hazard assessment and source mechanisms in seismically active areas and evaluation of reservoir induced seismicity, the hydrofracturing technology is being disseminated to industry for application on a wide front, including mitigation of hazards in mines and stimulation of yield from wells.

A modern geochronology laboratory was established during the year around a state-of-the art thermal ionization mass spectrometer. The existing facilities for isotopic measurement of light elements (C, O and S) and for potassium-argon dating were also reoriented to integrate the mass spectrometer laboratory and complement its programme objectives by way of providing the earliest signatures of biogenic activity and thermal histories of rocks subsequent to their primary crystallization. Recent advances in isotope ratio mass spectrometry have

dramatically increased the resolving power of the radiogenic isotopes of strontium, neodymium and lead as tracers of fundamental geological and planetary processes such as mass transfer rates between the crust and upper mantle during geologic time. The new laboratory has been especially planned to create a national capability for high precision isotopic research in earth sciences addressed to the investigation of some of the older crustal segments of the Indian Lithosphere for insights into the early crustal processes.

This year the institute had the distinction of hosting a Regional Assembly of the International Association of Seismology and Physics of the Earth's Interior (IASPEI) which is one of the seven Associations of the International Union of Geodesy and Geophysics (IUGG) between 31 October and 7 November 1984. A three-week course on 'Inversion Methods in Geophysics' was organized by the institute under the aegis of the International Commission for the Lithosphere. Also, a UNESCO-sponsored training course was organized and run by the institute on 'Methods and Techniques in Exploration Geophysics' with emphasis on ground-water exploration.

Five major sponsored research programmes were completed during the year and three new ones were undertaken. A sum of Rs 113 lakh was received during the year under various sponsored/collaborative programmes.

Twenty technical reports and 63 papers, including 38 in foreign journals, were published; 57 papers were presented in symposia/seminars.



CECRI Annual Report: 1985-86

The annual report of the Central Electrochemical Research Institute (CECRI), Karaikudi, for 1985-86, shows that during the year, eight CECRI technologies went into production, four new technologies were developed, and two sponsored schemes and eight consultancy services

were completed. With these, CECRI has so far developed 130 technologies, 82 of which have been transferred to 189 industrial concerns spread all over the country. Of the total NRDC receipt (Rs 48.3 lakh) by way of lumpsum fee and recurring royalty during the quinquennium 1980-85, the CECRI contribution alone accounts for Rs 12.3 lakh i.e. more than 25% (in fact more than 38% in 1985-86).

The country's first-ever plant for the continuous electrolytic production of magnesium in a 30 kA cell based on CECRI technology went into operation on 3 August 1985 at the Defence Metallurgical Research Laboratory's captive magnesium plant at Hyderabad. The first trial run was a success. Work was in full swing for the 600 tonnes/annum electrolytic magnesium plant at the Valinokkam village in Tamil Nadu. This would go into production in late 1986 or early 1987. With the commissioning of this plant India would become self-sufficient in this strategic material. The direct use of sea bitterns from tropical salt farms and the patented modular electrode designs in the cells are India's indigenous and novel contributions to the world. It is cheapest process for the production of magnesium, even with the high electricity tariff in India.

India's first-ever modular plant for the continuous production of electrolytic chromium based on CECRI technology went on stream in September 1985 at the India Chrome Metals (P) Ltd, Rourkela. This 35 tonnes/annum plant will meet part of the country's need. With the commissioning of this plant, India became the seventh country in the world to produce chromium electrolytically.

Trial production of gallium metal from Bayer liquor based on CECRI technology proved to be successful at the Madras Aluminium Company, Mettur. The CECRI technology has many novel design features. Bayer liquors from all the aluminium plants (INDAL, HINDALCO, BALCO, MALCO, etc.) were found to be suitable for gallium extraction by the CECRI technology. The metal has a great export potential.

The know-how of ion selective electrodes was transferred to the Progressive Piston Company, Hyderabad, and India's first-ever ion selective electrodes are in the market now. Initially, these electrodes are available for the analysis of chloride, cupric and silver ions, and other ion-specific electrodes would be introduced later.

In recognition of the importance of CECRI contributions in the field of corrosion prevention in pre-stressed and reinforced concrete used in marine bridges and structures, the Ministry of Shipping and Transport of the Government of India has given mandatory instructions to all central and state public work departments, to use CECRI know-how in all major constructions. Accordingly, this is being adopted in the 3 km long Pamban Bridge connecting Rameswaram with mainland and in the second Thane Creek Bridge in Bombay.

Galvanic anodes based on aluminium alloys for cathodic protection went into production at the Galvanic Protection Services, Karaikudi. This is the third licensee to take up the CECRI technology, and it has an installed capacity of 600 tonnes/annum.

The Indian Pulverizing and Processing Company, Pune, has commenced production of soak cleaning compound based on CECRI technology. This compound effectively removes all oils and greases commonly applied for corrosion protection during transit and storage.

The Interport Asiatic Company Ltd, Madras and the International Metallurgy and Engineering Company, Calcutta, commenced the production of inhibitor solutions for prevention of corrosion of steel reinforcement in R.C.C. and portland cement coating on steel reinforcements.

CECRI developed a process for the production of galvanic anodes based on zinc alloys for cathodic protection of structures and equipment. The alloy developed at CECRI gives less polarization and possesses high anode efficiency. CECRI had earlier developed galvanic anodes based on aluminium as well as magnesium. CECRI has also developed

the technology for impressed current cathodic or anodic protection systems.

The institute developed a technology for the production of polyphenylene oxide coatings from phenolic monomers by *in-situ* electropolymerization technique, over different metallic surfaces. The technique will find applications in automobile industry for surface protection and in polymeric capacitors in electrical and electronic industries. Another technology developed relates to the preparation of water-displacing, rust-preventive oil for corrosion protection in all metal finishing and engineering industries after pickling and phosphating.

Experimental conditions were determined in a 60 kVA arc furnace for the production of commercially acceptable grades of zircona-alumina abrasive material for metal grinding operations.

Feasibility studies on: (i) laboratory scale electrochemical reduction of benzene sulphonyl chloride to thiophenol (1 kg/batch) for the Dharamsi Morarji Chemicals Ltd, Bombay and (ii) synthesis of pyrazinamide by chemical/electrochemical methods for the PCI Pharmaceuticals, Bombay, were completed and reports submitted.

Consultancy services completed during the year relate to: Protective schemes for steel piles of building dock for the Cochin Shipyard, Cochin (final report submitted); Condition survey of Kallikota bridge on NH-5 in Andhra Pradesh (final report sent to the Chief Engineer, PWD, Government of Andhra Pradesh); Corrosion problems in CO₂ gas holder and synthesis gas heat exchangers for the Fertilizers & Chemicals Travancore Ltd, (recommendations for the prevention of corrosion were made in a detailed report to FACT); Painting of steel structures for the Madras Petrochemicals Ltd (painting schemes for corrosion prevention were suggested in the report); and Recovery of silver and palladium from secondary sources and purification of silver by electrolysis (report submitted). An on-the-spot study of the factory and the production process steps was made and remedial measures were suggested

in the final report to the Appollo Batteries, Raipur. The Swarna Aluminium Company, Coimbatore, commenced production of anodized aluminium extrusions based on the consultancy service rendered by CECRI. A report on protective schemes for external and internal surfaces of gas carrying steel pipelines was submitted to the Durgapur Steel Plant on completion of the consultancy assignment.

Over 75 scientific and other staff of CECRI are involved in voluntary rural development activities through the Rural Science Forum. Such activities were carried out in five villages, viz. Kundrakkudi, Tiruppalaikudi, Piranmalai, Soripparai-patti, and Mathur. The CECRI scientists interact with government officials, financial institutions and village people in setting up agricultural farms, poultry and animal husbandry units and appropriate industrial enterprises based on CECRI-CSIR or other technologies. □

EXTRAMURAL RESEARCH

Microbial degradation of cell wall polysaccharides with reference to *Erwinia chrysanthemi* and *Penicillium islandicum*

A CSIR research fellow, Shri K. Prabakaran, while working at the Department of Biosciences, Sardar Patel University, Vallabh Vidyanagar, studied the enzymic degradation of various cell wall polysaccharides (viz. cellulose, hemicelluloses and pectic substances) by *Erwinia chrysanthemi* and *Penicillium islandicum*. The cultural and morphological characteristics of both the organisms were examined using various biochemical reactions and staining techniques.

The studies showed that the bacterium *E. chrysanthemi* produces only endo-glucanase in the medium containing cellulose, carboxymethyl cellulose (CMC) and filter paper. The enzyme was found to be most active at 50°C and pH 6.5. The test organism did not produce either B-glucosidase or exo-glucanase. The endo-glucanase production was not affected by the presence of glucose. Even at 1%

concentration of glucose the organism produced the same amount of endo-glucanase as it produced in the presence of CMC.

Various metal ions, amino acids growth regulators and phenolics were used to find out their effect on endo-glucanase synthesis by the bacterium. Among the metal ions Mg^{++} , Mn^{++} , Ca^{++} and Zn^{++} were stimulatory or had no inhibitory effect on the production and on the activity of endo-glucanase. The bacterium showed high susceptibility to plant growth regulators and to various tests for phenolic compounds.

The bacterium failed to produce xylanases, arabinase and galactanase, when grown in the presence of xylan and arabinogalactan as carbon source, but produced various pectolytic enzymes, viz. pectic acid lyase (exo- and endo-PAL), polygalacturonase (endo- and exo-PG), pectinlyase (exo-PL) and polymethylgalacturonase (endo-PMG).

The fungus *Penicillium islandicum* produced all the three enzymes, viz. endo-glucanase, exo-glucanase and B-glucosidase necessary for cellulose degradation. Endo-glucanase, was found to be active at pH 3.0; exo-glucanase and B-glucosidase were active at pH 5.0, and the three enzymes showed optimum activity at 50°C. Production of these enzymes by the fungus were repressed in presence of glucose, cellobiose and other sugars and the repression was released by the addition of cyclic-adenosine monophosphate (CAMP) at 20 μ M concentration. The fungus showed strong 'glucose effect'.

Among the metal ions, Mg^{++} , Mn^{++} , Ca^{++} and Zn^{++} were found to be stimulatory for all the three cellulolytic enzymes. The other test metal ions were inhibitory even at low test concentration (5 m M). The fungal cellulases were susceptible to plant growth regulators and phenolics. At 0.05% concentration the plant growth regulators repressed the cellulase synthesis by the fungus. The test phenolics too were found to repress the cellulase synthesis even at low concentration of 5 m M.

The fungus also produced endo-xylanase, B-xylosidase, arabinase and various pectolytic enzymes, viz. PG, PAL, PL and PMG, and the enzymes had exo-activity. Both xylanases were active at pH 5.0 and showed optimum activity at 45°C. Arabinase was active at pH 3.0 and exhibited optimum activity at 35°C. Both arabinase and xylanases were found to be prone to glucose effect, and the production of these enzymes were adversely affected by the sugars. The repression caused by the sugars was released by cAMP and the original rate of enzyme synthesis was restored.

Both xylanase and arabinase were adversely affected by plant growth regulators, except IAA (indole acetic acid) which adversely affected xylanase synthesis, but did not affect arabinase synthesis. All the test phenols were found to be repressive to arabinase and xylanase syntheses.

Shri Prabakaran worked under the guidance of Dr H.C. Dube of the University and was awarded Ph.D. degree for his work. □

DEPUTATION BRIEFS

Photoelectrochemical conversion of solar energy to electricity

Dr Navin Chandra of the Central Electrochemical Research Institute (CECRI), Karaikudi, was one of the three recipients of the ICSU/UNESCO Distinguished Fellowship in Science for 1984. Under this fellowship he carried out research work on the photoelectrochemical (PEC) conversion of solar energy to electricity at semiconductor electrodes in the laboratory of Prof. A.J. Bard at the Chemistry Department, University of Texas, Austin, USA, during December 1984-November 1985.

Photoelectrochemical conversion of light to electricity is considered among one of the viable methods of tapping solar energy. In search of an efficient and stable system, a large number of semiconductor materials were investigated

with a view to improving their efficiency and stability. PEC conversion was studied at p-InP, n-ZrS₂ and iron oxide electrodes.

Hydrogen generation by dissociation of water is of great significance owing to fuel value of hydrogen. Dr Navin Chandra studied the quantum efficiency (Q) of the PEC hydrogen evolution reaction at single crystal p-InP electrode. Modification of the electrode surface by plating of a few monolayers of catalyst metals, viz. Pt or Au, was also studied and was found to improve 'Q' considerably. A maximum value of Q = 0.65 was obtained at Pt-plated p-InP. To increase Q, a kinetically faster PEC reaction, viz. reduction of Eu³⁺ was tried at the bare and Ru³⁺-treated p-InP. A maximum value of 'Q' = 0.8 was obtained for this reaction at Ru³⁺-treated p-InP.

For studies on n-ZrS₂ electrode, the single crystals of this material were grown by vapour transport technique. The PEC response of single crystal n-ZrS₂ was studied in several redox solutions. The electrodes were found to give best performance in Fe (II)/Fe (III) solution. A two-electrode cell in this electrolyte with Pt as cathode was found to give an open circuit voltage of ~ 0.4V and a short circuit current of ~ 15 mA/cm² under illumination.

The PEC studies on iron oxide were carried out on polycrystalline material. The silica-doped iron oxide electrodes were prepared by sintering the compressed material at elevated temperatures. PEC dissociation of water was studied at bare and 40 Å thick silver layer coated electrodes.

These studies gave some interesting and encouraging results which were published in the form of two research papers.

The visit provided Dr Navin Chandra an opportunity to meet several world famous electrochemists.

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Shri S.R. Kundu

Shri S.R. Kundu of the Indian National Scientific Documentation Centre, New Delhi, attended a training course on mini-micro version of CDS/ISIS bibliographical information retrieval package

for IBM PC and IBM PC compatible machines, organized by UNESCO at its Headquarters in Paris, during 23 to 27 June 1986.

Apart from him, the course was attended by seven participants from France (out of which five were from UNESCO), two participants each from Bulgaria and Ethiopia; and one participant each from Argentina, Canada, Chile, Cuba, Guyana, Hungary, Jamaica, Mali, Nepal, Peru, Trinidad and Venezuela. Every two participants were provided with an IBM PC/XT micro computer system to practice on during the training course.

CDS/ISIS is a generalized information retrieval package. It consists of menu driven programs and certain other facilities like a search language, a formatting language and others. One may set up data bases with it. Also one may retrieve data from data bases by making use of suitable menu options.

The mini-micro CDS/ISIS Release 1.0 (for IBM PC) is a copyright, 1986, of UNESCO and can be made use of by only those who have signed a licence contract with UNESCO. □

TRAINING COURSES

Refresher Course on Corrosion Science and Engineering

An extended course on Corrosion Science and Engineering was conducted from 7 April to 6 May 1986 at the Central Electrochemical Research Institute (CECRI), Karaikudi. Fifteen candidates from various organizations, including CECRI, participated in the course. The course covered the following subjects: Mechanism of corrosion and kinetics of corrosion processes; General methods of corrosion control; Electrochemical protection and corrosion monitoring methods; and Corrosion control of concrete structure. □

PATENTS FILED

1125/DEL/85: A method of bonding a polymer on clay surfaces, K.K. Bhattacharyya & A.K. Chatterjee—Indian Institute of Petroleum, Dehra Dun.

1127/DEL/85: Improvement in or relating to a process for the preparation of quinidine from quinine, A.K. Banerjee, S.B. Chaudhuri & S.C. Pakrashi—Indian Institute of Chemical Biology, Calcutta.

205/DEL/86: A process for the preparation of catalyst oxygen scavengers suitable for prevention of metallic corrosion in systems using different grades of waters, I. Singh & V. A. Altekar—National Metallurgical Laboratory, Jamshedpur.

204/DEL/86: An improved process for the preparation of stable anionic fatliquor based on oils having iodine values less than 100, K.I. Vijayalakshmi, G. Basakar, V.V.M. Rao and S. Rajadurai—Central Leather Research Institute, Madras.

187/DEL/86: An improved process for the preparation of 2-bromo-1-phenylethanol, S.S. Bhosale, M.V. Natekar, P.L. Joshi, K.N. Dixit, A.S. Vaidya and A.S. Rao—National Chemical Laboratory, Pune.

195/DEL/86: Improvements in or relating to the process for the preparation of lactone of γ 2, 2-dimethyl-3-(2, 2, 2-trichloro-1 hydroxy ethyl) cyclo-propane carboxylic acid, R.B. Mitra, G.H. Kulkarni, P.N. Khanna, B.M. Bhawal, A. Rakeeb, and A.S. Deshmukh—National Chemical Laboratory, Pune.

196/DEL/86: Improvements in or relating to the process for the preparation of 1, 1, 1-trichloro-4-methyl-pent-3-ene-yl diazoacetate, R.B. Mitra, G.H. Kulkarni, P.N. Khanna, B.N. Bhawal, A. Rakeeb & A.S. Deshmukh—National Chemical Laboratory, Pune.

278/DEL/86: A process for the preparation of diesel oil and kerosene substitutes from heavy tar fraction obtained by low temperature carbonization of coal, A. Mirza, K.V. Ramanamurthy & R. Vaidyeswaran—Regional Research Laboratory, Hyderabad.

277/DEL/86: Improved method of making silver ion-sensitive coated film electrode, G.P. Rao, S. Jaya & T.P. Rao—Central Electrochemical Research Institute, Karaikudi.

351/DEL/86: An improved device for aeration of liquids, S.N. Kaul & H.J.N. Patil—National Environmental Engineering Research Institute, Nagpur. □

CSIR NEWS



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CCRI EXTENSION CENTRE AT KHURJA

Inauguration of CGCRI Khurja Centre

Situated in the state of Uttar Pradesh, Khurja has been a centre for production of traditional pottery for the last several centuries. It has the highest number of small and cottage scale ceramic industries in the country with more than 500 units employing about 20,000 people. Most of these units, however, suffer from various technical constraints and to keep them alive an immediate need was felt for introduction of improved and appropriate technologies in these industries. Thus, it was decided that an extension centre of the Central Glass and Ceramic Research Institute (CGCRI), Calcutta, should be set up at Khurja to render technical services to the small scale and rural sector industries in and around Khurja.

Though the Centre started functioning in March 1982, it was only on 3 May 1986 that it was formally inaugurated by Shri N.D. Tiwari, Union Minister of Industry. Dr A.P. Mitra, Director General, CSIR, was the Chief Guest at the inaugural function.

Dr S. Kumar, Director, CGCRI, in his welcome address said that the objective of setting up this centre was to help and promote cottage scale industry in Uttar Pradesh. The establishment of this Centre in 1982, according to Dr Kumar was possible because of the encouragement received from Prof. Nurul Hasan, the then Vice President of CSIR and the all out support of Shri N.D. Tiwari, the then Chief Minister of U.P.

Referring to the problems of the industry, he said that although this centre is at its infancy, it has already developed and demonstrated to the industry a new technology package for production of white stoneware. It has demonstrated that by adopting the new technology it would be possible to save 20-50% of the fuel and achieve a substantial reduction in environmental pollution. He specially requested the state-owned small scale pottery development centres to come forward and adopt, for the benefit of the dependent potters and

for the under-privileged sections of the society, the new technology package offered by CGCRI. Dr Kumar disclosed that the CGCRI Khurja Centre has also taken up an ambitious programme, in collaboration with the Council for Advancement of Rural Technology (CART), to develop and demonstrate a technology package which is of direct relevance to rural housing, sanitation and supply of pure drinking water.

Dr A.P. Mitra in his address explained the role of CSIR as a whole towards the upliftment of the rural, cottage and small scale industries of the country. He appreciated the role being played by CGCRI, as well as its Khurja Centre in developing appropriate technologies and arranging for their demonstrations to the user agencies, which is in line with the policy of CSIR to induct modern science and technology at the grass root levels. He said that in CSIR laboratories more demonstration programmes on appropriate technologies would be arranged so that improved technical services could be rendered to the industries.

Shri N.D. Tiwari in his inaugural address said that our country is rich in mineral resources suitable for production of sophisticated articles of ceramics and glass and stressed that appropriate R&D efforts should be made to develop new technologies to harness this hidden treasure for the benefit of the weaker sections of the country. The minister emphasized that such technologies should be need-based and result-oriented so that the small scale industries can make quality products and can compete in export markets with the products made by the developed countries.

Commending the role of CGCRI scientists in developing a technology package for production of white stoneware with 20-50% energy savings, the minister directed the industry officials from the Government of U.P. to implement the improved technology developed by CGCRI in three years in the state. He called upon financial institutions and



Shri Narayan Dutt Tiwari, Union Minister of Industry, inaugurated the CGCRI Khurja Centre on 3 May 1986. Seen with him at the inaugural function are: Dr A.P. Mitra, DG, CSIR (right) and Dr S. Kumar, Director, CGCRI (left)

banks to come forward with liberal loan schemes for implementation of modern technology in the small scale sector. He further suggested that CGCRI and other CSIR laboratories should organize seminars periodically for the benefit of entrepreneurs in the small scale and rural sectors.

The minister announced at the function that a Centre for Glass Development would soon be set up at Firozabad which has been a centre for production of

traditional glass articles for the last several centuries. He also took decision for setting up a high level committee headed by Dr Kumar, to go into the details of the problems faced by cottage and small scale ceramic industries of the country.

An exhibition of ceramic products manufactured at the Khurja pottery industries and a seminar entitled national workshop on Low-cost Longer Life Saggers for Cottage Scale Pottery Industry, were also organized on the occasion. □

Workshop on Technology Forecasting & Assessment

A lecture-cum-workshop on Technology Forecasting and Impact Assessment was held on 11-14 July 1986 at the National Institute of Science, Technology and Development Studies, New Delhi. In the morning session of the first day, Prof. Harold A. Linstone, Senior Editor of *Technology Forecasting and Social Change*, and Director of the Futures

Research Institute, University of Oregon, USA, delivered a lecture on 'Technology Forecasting'. This was followed by presentation of some of the work done in technology forecasting in India by experts from the Jawaharlal Nehru University, Delhi University (Systems Group) and the CSIR laboratories. The lecture was attended by officials from the Planning

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Commission and other concerned government departments. The deliberations were chaired by Dr J.G. Krishnayya, Director, System Research Institute, Pune, and Shri Lovraj Kumar, Consultant, Energy Advisory Board.

The Lecture

In his lecture, Prof. Linstone traced the history of technology forecasting from its origin during and after the Second World War and described methods such as Delphi, trend extrapolation and trend correlation, etc. used for technology forecasting. According to him the accuracy of a forecast depends more on the core assumptions made rather than on the sophistication of the model or mathematical technique used.

He questioned the use of indices like GNP per capita for long term projections when less tangible indices such as work satisfaction, resource intensity, ecological compatibility, etc. may become more relevant. Due to inbuilt bias and lack of imagination on the part of the modeller, forecasts tend to be over-optimistic in the short run and pessimistic in the long run. This is because we tend to underestimate problems that come up in the short run, which will hinder a particular



Prof. Harold A. Linstone, Senior Editor of *Technology Forecasting and Social Change*, delivering his lecture at NISTADS

technology, but cannot imagine breakthroughs which would solve problems unsolvable now.

Dr Linstone described the 'technological substitution' technique which measures the rate at which a particular technology is replaced by a rival, more advanced one, and the technological progress function which measures the rate at which innovations occur. Historically, basic innovations tend to occur in time in clusters, in line with the 60-year Kondratieff economic cycles.

Discussion that followed the lecture brought out the problems of emerging complex enterprises. The innovation levels and creativity are higher in small but well-funded and well-managed companies, whereas large corporations do better in the marketing of the basic innovations produced by the small companies. In order to cope with the challenge posed by small companies in creativity, many large corporations, such as IBM, are developing 'intrapreneurs', i.e. executives within the systems who are given the initiative and backing, to come up with innovative solutions, working in small units.

In this connection, Dr Linstone discussed the Japanese approach to industrial management, and discussed some of the strong and weaker points of both the Japanese and American systems of industrial management.

Commenting on the vulnerability of technological innovations, and of the life-span of innovations, Dr Linstone said that this depended very much on the value systems and the organizational structure need not always remain favourable to the successful development and utilization of innovation. He cited the example of UK, which was becoming part of a fifth world of formerly developed societies, which are losing their technological edge.

The Workshop

In the workshop that followed, many distinguished Indian speakers presented salient aspects of their work. Dr R.K. Iyengar, Additional Director General of

CSIR, chaired the workshop.

Dr J.G. Krishnayya discussed the potential market place for information in the Indian context. He proposed a model of data collection from groups of various industrial organizations directly in a much faster way than the present statistical compilations which some government agencies bring out. The potential users for such data would include other industries; and would be useful for export planning, developmental planning, industrial investments, etc.

Dr A.K. Ghoshal (CSIR) presented some of the technological substitution models that he had developed for the Indian Airlines for predicting their demand patterns, and a model developed for the study of bagasse based paper plants.

Dr Karmeshu of the Computer Centre, Jawaharlal Nehru University, presented some aspects of non-linear stochastic models which deal with the diffusion of information in societies and gave example of how the models can be used for the identification of crisis points in socio-economic transformation. Presenting a joint study done by him with Dr S.C. Bhargava of the Delhi University, he described the application of non-linear modelling techniques to situations where two technologies compete for a given market. Studies undertaken by NISTADS indicate the possibilities of using this approach to describe the coexistence of

different levels of technologies in India and the rate of substitution of old by new technology under the structured and regulated economies like that of India.

Technology forecasting studies in biotechnologies initiated by NISTADS, were presented by Dr S. Mohan and Dr Mehrotra. The questionnaires prepared for Delphi techniques for this project were explained.

In the concluding part of the workshop, Dr Linstone prophesied that the application of robots to the manufacturing process would change the whole concept of the scale of the manufacturing economy when it would be possible to have individualized, custom-made products on a large scale, having great impact on jobs, and on compatibility with the existing factory set-ups.

On the last day, Dr Linstone gave a lecture on 'Technology Assessment' in which he emphasized that technology assessment has three important components: technology, organization and personnel (TOP). He gave several examples where neglect of O and P made the assessment irrelevant to decision making.

Summing up the discussion, Shri Lovraj Kumar, reiterated the importance of including organizational and management aspects in the assessment of technology and suggested that teams consisting of technologists, managers and users of technology should work together for a meaningful assessment. □

Workshop on Science and Technology for Regional Development of Mewat

The National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, has undertaken a programme, in collaboration with the Mewat Development Board (MDB), and the Department of Science and Technology (DST), on Utilization of Local Resources and Upgradation of Traditional Skills for the Development of Mewat Region in Haryana. The main objective of this programme is to raise the economic

status of the local people through generation of employment opportunities. The programme has two main components: Firstly, an assessment would be made of the local resources and skills to identify the technological gaps with a view to introducing technological innovations to develop the economic base of the region. The development of the region involves upgradation of traditional technologies; implementation of new technologies;

integration of traditional and modern technologies and helping the local people in the organization of marketing of products. Through an interactive process involving the local people, scientists and administrators, a viable technology delivery system would be evolved. Secondly, as a part of the national mission of DST on the development of Natural Resources Data Management System (NRDMS), a socio-economic and natural resources database for Gurgaon district would be set up. It could be used as an aid to decentralized planning and decision making for development.

Before launching this programme, it was considered necessary to make a realistic assessment of the existing socio-economic conditions of Mewat. For this

purpose a Workshop on Science and Technology for Regional Development of Mewat, jointly organized by the Mewat Development Agency, NISTADS and DST, was held at the Sohna Tourist Complex (Haryana) during 18-19 July 1986. It was attended by scientists, technologists, planners, administrators, local functionaries, and artisans.

Speaking at the inaugural function, Shri Kulwant Singh, Financial Commissioner and Chairman, State Level Implementation Committee, Mewat Development Board, said that the new technology for cottage industries must ensure increase in the productivity and income of the artisans for the removal of backwardness of Mewat. A comprehensive survey of cottage industries and artisans should be

conducted. He also emphasized that available natural resources of Mewat should be fully utilized for its development.

Dr Ashok Jain, Director, NISTADS, said that in addition to providing technology, the developmental agencies of the region should also prepare a plan for supply of raw materials and machinery to the rural industrial units and make marketing arrangements for their products so that new entrepreneurs can get profitable share of their products.

Shri L.D. Kataria, Vice Chancellor, Haryana Agricultural University, said that latest agricultural technology should be provided for the agricultural development of Mewat.

Shri S.P. Bhatia, Joint Secretary (Revenue), Government of Haryana, stressed on the preparation of action plan based on recommendations and decisions for development of Mewat through science and technology.

Shri Naresh Gulati, Chairman, Mewat Development Agency and Deputy Commissioner, Gurgaon, told the gathering that an amount of Rs 50 lakh will be spent on the project on Science and Technology for Regional Development of Mewat, undertaken by NISTADS. The Government of Haryana will bear half of the cost of the project, and the other half will be borne by NISTADS/CSIR.

Shri Dalip Singh, former Chief Executive Officer, Mewat Development Agency, while giving an account of activities of the Agency said that the joint project of NISTADS and MDB on Science and Technology will be very helpful in rural industrialisation of Mewat and will directly contribute in raising the socio-economic status of the artisans of the region.

Shri M.A. Qureshi, Programme Co-ordinator, said that until and unless the traditional technology is upgraded and modern technology is brought to the level of rural artisans, the goal of application of science and technology for rural development will not be achieved.

Dr Subhan Khan, Project in-charge, stated that the main aim of the NISTADS programme in Mewat is to develop a technology delivery system for rural arti-



Speaking at the Workshop on Science and Technology for Regional Development of Mewat is Dr Ashok Jain, Director, NISTADS. Seated from left are: Shri Kulwant Singh, Financial Commissioner and Chairman, State Level Implementation Committee, MDB; Shri L.D. Kataria, Vice Chancellor, HAU; Shri Naresh Gulati, Chairman, MDA; and Dr Subhan Khan, In-charge of the NISTADS-DST-MDB project

sans and entrepreneurs through utilizing natural resources of the region.

The local artisans also expressed their views and informed the scientists and administrators regarding their problems.

The following recommendations emerged from the deliberations of the workshop.

1. Survey of artisan-based crafts and products may be undertaken to identify areas of technological intervention and problems of marketing the products for devising appropriate marketing structure.

2. Out of a number of existing craft-based industries; a few crafts like pottery; leather works and *mudba* making may be taken up for improvement in technologies and marketing at the first instance.

3. In collaboration with CSIR laboratories and other national and local institutions; new technologies may be identified for setting up production units utilizing local resources. The new areas may include forest-based industrial production; rural housing, building materials, sanitation; and renewable sources of energy.

4. Study may be undertaken of ITI's and other existing training facilities in Mewar in particular and the country in general for upgrading the skills of the local people required and for implementing the plan of action of technological intervention.

5. Study may be undertaken for identifying the factors including socio-cultural features which inhibit the local people in the adoption of technological innovations in the region.

6. The district data base being set up by DST, through NISTADS, should be fully utilized for developmental planning at village, block, district and regional levels.

7. On the basis of the above framework and recommendations an action plan with distinct phases may be worked out for implementation. □

Workshop on Leather Processing Technology

A workshop on Leather Processing Technology was organized at the Central Leather Research Institute (CLRI), Madras, during 5-9 May 1986, as part of the Commonwealth Science Council's Industrial Support Programme, and in view of a recommendation of the Executive Committee of CSC which met in London last year. The committee had observed that modern process technology of industrial commodities such as leather was important, and new techniques be introduced to assist developing countries enhance their exports.

The main objective of the workshop was to familiarize the participants from India and Malaysia, including the representative of CSC, with the latest processing techniques and to acquaint them with uses of animal byproducts.

The workshop was inaugurated by Dr V. Kulandaiyamy Vice-Chancellor of the Anna University and was presided over by Dr G. Thyagarajan, Director of CLRI, who had earlier led the CSC Asia/Pacific Project designed to help countries control the troublesome aquatic weed, water hyacinth and develop economic uses for it. □

NIO-ONGC Collaboration in Marine Gravity Studies

A collaborative project on detailed high precision marine gravity studies of the western continental shelf between Devgarh and Karwar has been successfully completed by the National Institute of Oceanography (NIO), Goa and the Oil and Natural Gas Commission of India (ONGC). Under the project about 8400 line km gravity surveys covering an area of about 43,000 sq. km were completed during January-March 1986, during twenty-first cruise of *ORV Sagar Kanya*.

A non-stabilized vertical sensor marine gravimeter was used and relative variations in gravity values were measured to an effective accuracy of ± 0.4 mgal. These

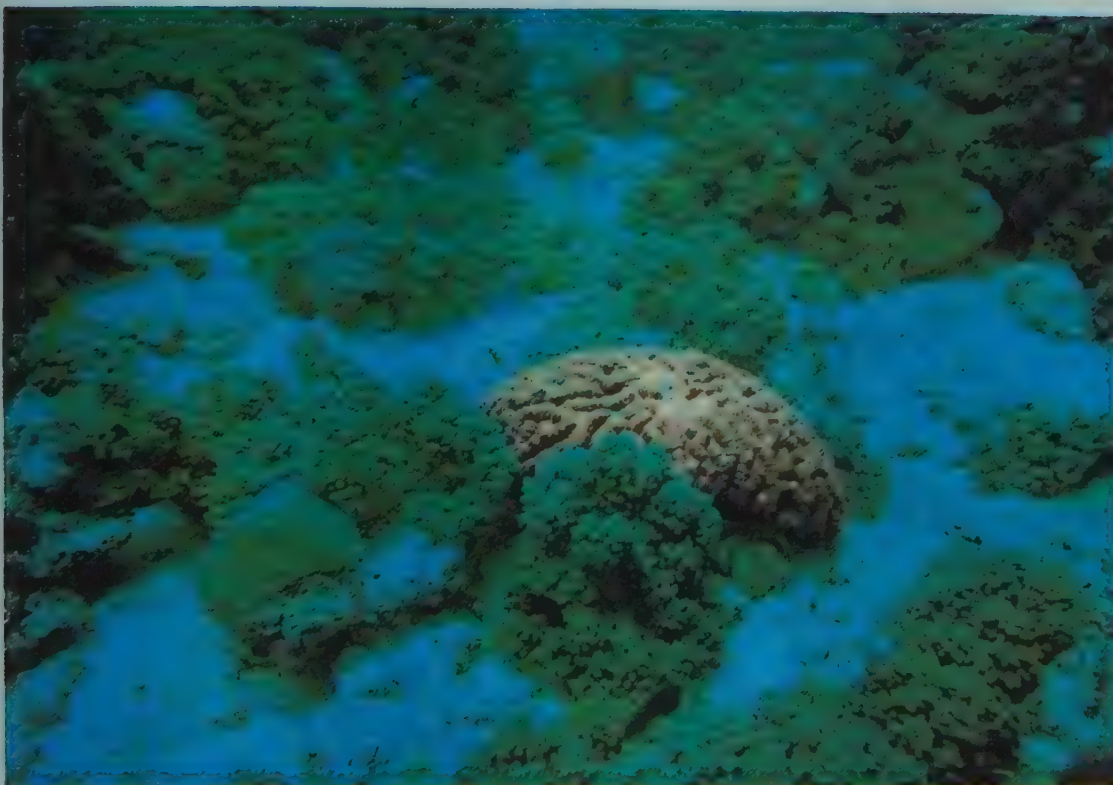
data were reduced to a shore gravity base at Mormugao Harbour established by the Surveys of India, Geodetic and Research Branch, Dehra Dun, UP. A software package was developed for onboard plotting of composite profiles of marine geophysical data like magnetic and gravity (measured gravity, Eotvos corrected gravity, free air and Bouguer anomalies) anomalies along with bathymetry, and the plots of the data after processing and reduction on to various scales were prepared on an HP 1000 series computer and plotter.

Anomaly maps of the data are being prepared to study the geology, structures and tectonic lineaments contributing to the observed anomalies. Further model studies will be carried out to obtain a comprehensive and detailed picture of the geology of the area and to infer the various geological processes that are responsible for the evolution of the margin.

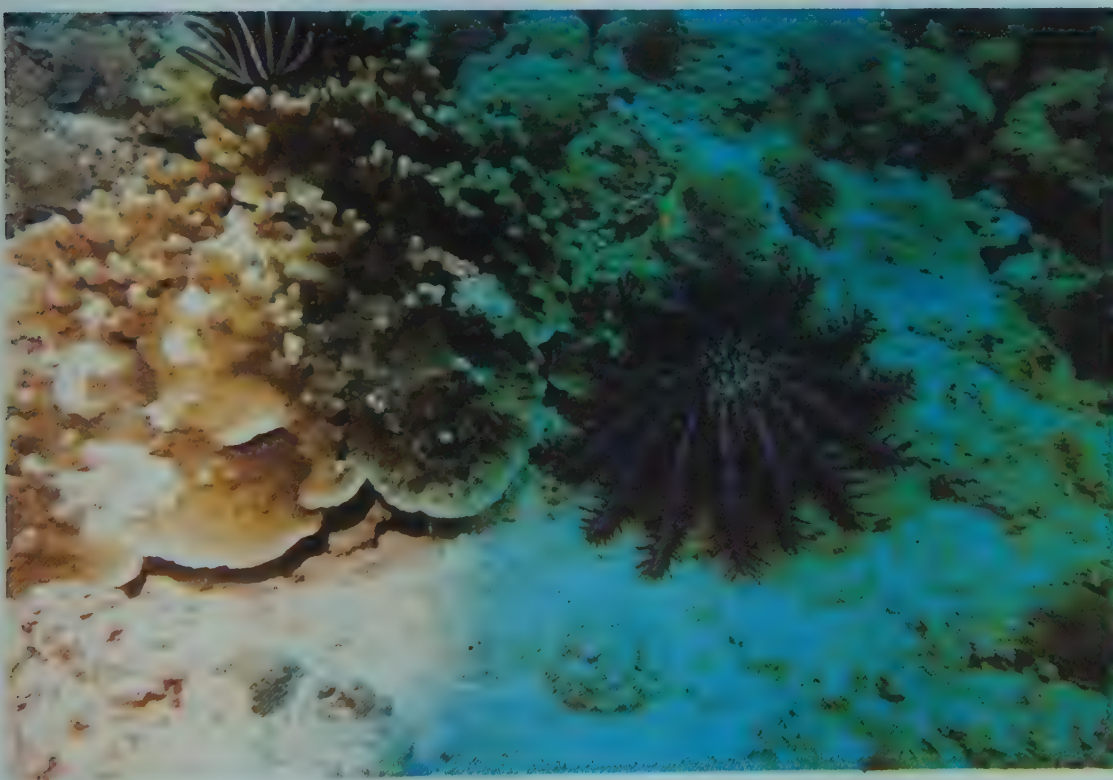
This collaborative project supplements the regional gravity investigations on the western continental margin of India being carried out by the Geological Oceanography Division of NIO. □

INDO-US Collaborative Project on Bioactive Substances from Indian Ocean

An R&D project, 'Organic Chemicals from the Sea', in operation at the National Institute of Oceanography (NIO), Goa, since 1978, has been strengthened with the Indo-US collaboration and renamed as Bioactive Substances from the Indian Ocean. This is a multi-institutional project. The participating laboratories from India are: NIO; Central Drug Research Institute, Lucknow and the Bose Institute, Calcutta. The corresponding laboratories of United States are: Stevens Institute of Technology, New Jersey; Osborne Laboratories, New York; and the Department of Biological Sciences, University of Southern California, Los Angeles. This is a three-year project with a total contribution from United States under the PL-480 programme



Dense aggregation of soft coral of Leeward Reef at Agati (Lakshadweep island)



Acanthaster sp. (blue star fish) along with a Meruline sp.

As a part of this project, seven scientists were trained as divers in the Diving School of Indian Navy and four of them received advanced training for three months in USA. This team is the first group of scientist divers in India.

Under the project, organisms have been collected from inter-tidal regions along the west coast of India and part of the east coast and from sub-tidal regions of the Grande Island off Goa and several coral reefs of the Lakshadweep.

The significant findings of the project so far include several species of corals and gorgonians. One form of seaweed indicates anti-implantation activity. Apart from this, several other useful flora and fauna have been observed to indicate analgesic, antiviral, CVS and CNS depressant and stimulant activities. Acanthaster species collected from Lakshadweep islands was found to exhibit toxic and anti-histaminic activity. These are preliminary findings and further studies are in progress for determining the active constituents and their chemical structures. □

Quaternary Upwelling and Climate in the Arabian Sea related to Monsoon Events

A joint Indo-FRG collaborative scientific programme on Quaternary Upwelling and Climate in the Arabian Sea related to Monsoon Events was launched from Djibouti on 29 April 1986, with an oceanographic expedition onboard *F.S. Sonne* in the Arabian Sea. Five scientists from the National Institute of Oceanography (NIO), Goa, Shri M.V.S. Guptha (Micropaleontology), Shri H.N. Hashimi (Sedimentology), Shri V.K. Banakar (Radiochemistry), Shri B. Umamaheswara Rao (Electronics) and Shri R. Venkatesan (Mechanics) along with the scientists from the universities of Hamburg, Heidelberg and Kiel (FRG) participated in the first part of the programme. The main objective of this part of the programme was to deploy at a water depth of about 4000 m three sediment traps specially designed to collect suspended particulate

amounting to approximately one million US dollars. This is one of the biggest projects of its kind for identification of potential drugs from the sea.

The project was inaugurated in January 1984 by Shri Shivraj V. Patil, Minister of State for Science & Technology and Vice-President, CSIR.

matter in the Arabian Sea to understand the source and nature of the sediment and sedimentary processes. In advance of this NIO had already deployed sediment traps in the estuaries and on the continental shelf.

The deployment of deep sea sediment traps is first of its kind in the deep Arabian Sea. This unique experiment on sediment traps provides an opportunity to study the flux of suspended particulate matter at two different depths every 12 days for a period of six months (May-October 1986). The period of deployment is ideal for studying the sedimentary processes operating during pre-monsoon, monsoon and post-monsoon periods. The experiment is also of considerable value in understanding the upwelling phenomenon in the Arabian Sea water and identifying the fauna indicative of upwelling. This in turn would aid in delineating the older upwelling episodes as recorded in the sediment cores.

In addition to the above data, information on the water currents in the Arabian Sea would be obtained by the current meters attached to the sediment trap mooring.

During the cruise, zooplankton samples and sediment cores were collected from the Arabian Basin, Owen Fracture Zone, Laccadive Sea, Carlsberg Ridge and Somali Basin as a part of the experiment.

On the completion of the first part, the cruise terminated at Mauritius on 4 June 1986.

The second part of the collaborative programme consisting of retrieving these sediment traps by the Indian research vessel *Sagar Kanya* is planned for October 1986. The samples and other data thus collected would be jointly investigated by India and FRG on problems such as sedimentology, micropaleontology and geochemistry. □

Simple wheat milling unit

A mini wheat mill, based on technology developed at the Central Food Technological Research Institute (CFTRI), Mysore,



Simple wheat milling unit developed by CFTRI

has been commissioned recently at Alur, Kudlige Taluk, Bellary District of Karnataka. This mill has the capacity to process 100 kg of wheat per hour to bakery flour and *atta* simultaneously. It integrates traditional components like huller, mill, hand-operated mixing drum and terminal sieving unit.

The mill can be installed in the rural sector as it involves low capital investment with great potential for self-employment and can be run even by unskilled personnel. It can boost the growth of bakery industry on small scale, cottage scale, or even family scale. □

Electrochemical sensors

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a process for making electrochemical sensors for monitoring bromide, iodide, cyanide, mercurous and lead ions. These sensors are useful in monitoring the concentration of respective ions in solution. Hence they find wide application in analysis of industrial solutions and effluents, and in monitoring environmental pollution.

The performance of these sensors has been found to be comparable with those of the imported electrodes for both the potential-versus-concentration response data and time response data. It is estimated that the total capital outlay for a plant of capacity 1500 sensors/annum would be around Rs 2.15 lakh and the cost of each unit would be around Rs 210.

The institute had worked out a process earlier for making ion selective electrodes for chloride, silver and cupric ions [*CSIR News*, 35 (1985), 154] and these electrodes are now in commercial production by the Progressive Piston Company, Hyderabad. □

Fire-retardant resin

The Regional Research Laboratory (RRL), Trivandrum, has developed a fire-retardant resin from cashewnut shell liquid. The resin, obtained by chemical modification of cashewnut shell liquid by reaction with phosphoric acid, was found to be miscible with many plastics and hence it can be used as a fire-retardant for plastics. Vertical burning tests showed that the final product does not propagate fire,

shows no after glow and the system is self extinguishing. The resin would be extremely good for making polyurethane foam fire-retardant.

The laboratory has also developed fire-retardant formulation for coir and coconut leaf thatch based on the well-known combination of urea and diammonium hydrogen phosphate. An after treatment with a phenol-formaldehyde resin solution reduced the moisture intake and made the fire-retardant treatment durable. The treated coir showed no propagation of fire, no after-glow and the weight loss was below 10%. This treatment might boost the export market of coir and coir products as safety regulations in foreign countries require these products to be fire-retardant treated. □

Biologically active products from *Androsace saxifragifolia* and synthesis of chloroacetyl derivatives

Androsace saxifragifolia, an annual herb occurring wildy in the Gangetic plain is reputed for its action as an abortifacient agent. Earlier work on the plant reports the isolation of primulagenin-A, a known triterpenoid sapogenol. A detailed investigation on the leaves of the plant carried out by Smt. Gita Roy of the Indian Institute of Chemical Biology (IICB), Calcutta, led to the isolation of cyclamiretin-A, cyclamiretin-D and a new triterpenoid sapogenol, androsacenol. Spectrometric studies including mass, ^1H and ^{13}C NMR coupled with chemical transformations led to the elucidation of the structure of androsacenol as 3 β 16 α -dihydroxyolean-13, 28-epoxy-22 β -acetoxy-30-al. The triterpenoid and its glycoxides which were isolated are of interest for their biological activity.

Friedel-Crafts acylation with dichloroacetyl chloride of the aromatic compounds, resorcinol, resorcinol dimethylether, pyrogallol trimethylether, dimethyl aniline, 2-methylnaphthalene and 2,6-dimethyl-naphthalene was carried out for the purpose of preparing physiologically important chloroacetyl derivatives.

Besides obtaining the expected chloroacetyl derivatives, an important phenomenon in Friedel-Crafts chemistry was observed which was hitherto unknown. It was found that when substrates with greater degree of nucleophilicity, e.g. resorcinol dimethylether are used in higher molar proportion, under Friedel-Crafts conditions, polynuclear compounds are produced by novel reaction mechanisms.

Smt. Roy carried out these studies under the guidance of Dr S.B. Mahato of IICB and was awarded Ph.D. degree by the University of Calcutta for her thesis based on these studies. □

Microbial transformation of steroids

The application of microbiology in steroid industry is of comparatively recent origin. However, many of the steroid drugs are now prepared by a combination of chemical and microbiological methods. The reactions which are difficult to be carried out chemically, proceed with ease when mediated by microorganisms. Smt. Atreyee Mukhopadhyay of the Indian Institute of Chemical Biology (IICB), Calcutta, with a view to preparing medicinally and economically important steroid derivatives by microbial transformation, isolated two microbial strains, *Aspergillus fumigatus* and *Streptomyces albus* from soil by enrichment culture technique using the relevant steroids as sole source of carbon. Metabolism of progesterone by the strain of *Aspergillus fumigatus* was studied and the four metabolites isolated were characterized as 5 α -pregnane-3 β -01-20-one, 15 β -hydroxy-1,4-pregnadien-3, 20-dione, 7 β , 15 β -dihydroxy-4-pregnene-3, 20-dione, and 11 α , 15 β -dihydroxy-4-pregnene-3, 20-dione. The strain converted testosterone into 15 β -hydroxy testosterone in 59% yield.

Three chemical steps are involved in the preparation of progesterone from 16-dehydropregnenolone acetate (16-DPA). With a view to preparing progesterone from 16-DPA directly, a strain of *Streptomyces albus* was isolated using 16-DPA as sole carbon source. Fermentation

of 16-DPA with this strain yielded 16-dehydropregnenolone and 16-dehydropregesterone. Similar incubation of pregnenolone acetate with this strain afforded pregnenolone, progesterone and 20 α hydro progesterone while dehydroepiandrostrone acetate was converted to dehydroepiandrostrone, androstenedione and testosterone. The strain was also capable of converting testosterone. All the metabolites were characterized by employing ^1H and ^{13}C NMR, mass spectrometry and IR analysis.

Smt. Mukhopadhyay carried out these studies under the guidance of Dr S.B. Mahato of IICB and was awarded Ph.D. degree by the University of Calcutta for her thesis based on these studies. □

NEW PUBLICATIONS

Sanitation for Rural India

The National Environmental Engineering Research Institute (NEERI), Nagpur, has been engaged in rural sanitation programmes and development of appropriate technology for the same, since its inception. In collaboration with the Zilla Parishad, Nagpur, it has constructed over 1200 latrines based on its design and has assessed the beneficial effects of these on the health status of the user communities.

In keeping with the Seventh Plan objectives, and the goals of the International Drinking Water Supply and Sanitation Decade (1981-90) of the United Nations, NEERI is providing R&D support for the success of the programmes by providing the implementing agencies with information and expertise relating to design, construction, use and maintenance of the pour flush water seal pit latrines and other low cost sanitation systems.

The sanitary latrines evolved by NEERI are simple and easy to construct at a low cost. NEERI provides training to rural artisans in the art of casting of cement concrete water closet pans and traps and the construction of the pour flush pit latrines. It also supplies (at cost) to the public health engineering and panchayat

raj departments, cement concrete moulds to be used for casting of pans and traps.

The title publication is intended to provide information to any organization contemplating to promote rural sanitation, and will be very useful to rural planners, environmental engineers and administrators. Enquiries pertaining to the publication may be addressed to: The Director, NEERI, Nagpur 440020.

Parboiling of rice

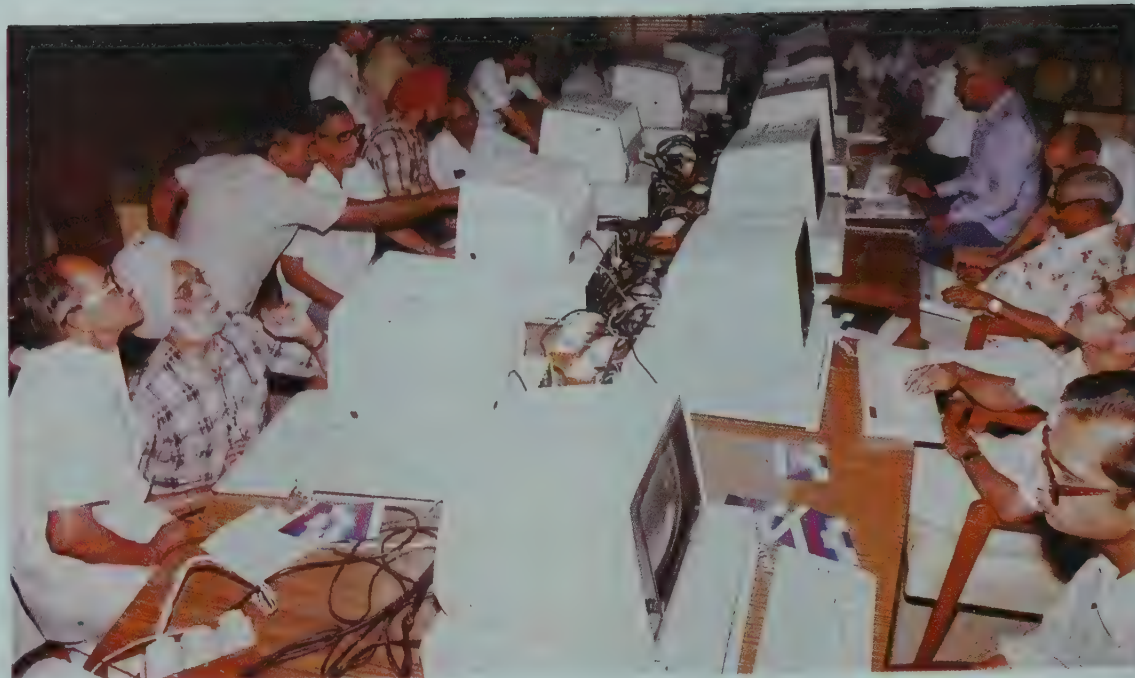
The Regional Extension Service Centre (Rice Milling) at the Central Food Technological Research Institute (CFTRI), Mysore, has brought out a booklet on Parboiling of Rice. It covers: Conventional methods of parboiling, Pressure parboiling, Sella process: dry-heat parboiling, small scale parboiling, Drying of parboiled paddy, Properties of parboiled rice, Advantages of parboiling, etc. It contains 22 references relating to the field.

Enquiries pertaining to the publication may be addressed to: The Director, CFTRI, Mysore 570 013. □

TRAINING COURSES

CEERI Training Programme on Office Automation

The Central Electronics Engineering Research Institute (CEERI), Pilani, has initiated a programme on modernization of management functions including office automation. It has already procured desk top computers (IBM PC Compatibles), while the central multiterminal super microcomputer is under procurement. CEERI proposes to develop a central data base to be used as an Integrated Management Information System (IMIS) for various activities of the institute. In the first phase CEERI has identified certain core wings of management like administration, finance, materials management, information, research planning and management and batch production units to effectively use such managerial tools for greater productivity and better efficiency.



Training programme on Office Automation in progress at CEERI

The Microprocessor Development Group of the institute conducted four courses (7-24 April 1986) for different groups of staff after identifying their specific requirements. The courses were highly practice-oriented and incorporated case study, exercises and routine examples applicable to CSIR working environment. The first course was tailored for operative administrative staff, and was on word processing packages (Word Star) for documentation applications. The second was meant to describe dBase III for data base management applications. The course was attended by staff already doing similar work manually. The group under training was also acquainted with another package, viz. LOTUS 1-2-3. Subsequently, a brief orientation programme was designed for senior scientists (Word Star, dBase III, Lotus, side kick) to acquaint them with PC software and its need-based utilization. The fourth one, meant for scientists, was on use of these packages for project planning, research reports, graphics and other relevant scientific applications.

The courses were held using effective teaching aids; each participant was provided with a personal computer for practice.

CEERI aspires to extend this training programme to all CSIR laboratories and subsequently to other R&D organizations.

Storage Battery Technology

The Central Electrochemical Research Institute (CECRI), Karaikudi, conducted a one-week course on Storage Battery Technology during 26-31 May 1986. Eleven persons from various organizations including CECRI attended the course.

The course dealt with basic techniques and the systems concerned with batteries, safety problems, the evaluation techniques and the survey of battery industry in India.

Training Course on Diesel Engine Cycle Simulation

A training course on Diesel Engine Cycle Simulation with specific reference to its application to diesel engine design and development was organized at the Indian Institute of Petroleum, Dehra Dun, during 7-18 July 1986. Six engineers from the Hindustan Machine Tools Ltd, Pinjore, participated in this course.

The course covered the fundamentals of thermodynamics and engine processes,

numerical analyses and computations and a detailed analysis of simulation of diesel cycle by quasi static thermodynamic models. One such cycle developed for diesel engine was demonstrated on the computer. Advanced concepts of mathematical modelling were also discussed. The utility of mathematical models in design and optimization of engine and its sub-systems was highlighted.

The course ended with concluding discussion session and award of certificates to the trainees. □

CONFERENCE BRIEFS

International Conference on Aluminium

Prof. P.K. Rohatgi, Director, Regional Research Laboratory (RRL), Bhopal, recently presented four research papers (coauthored with his colleagues: Dr Prasad, Shri Asthana, Shri Das, Shri Modi, Dr Yagneshwaran and Dr Narendranath) at the International Conference on Aluminium held in Virginia, USA. These presentations clearly established that India leads the world in research on cast metal ceramic particle composites, and led to several enquiries for this technology from many aluminium, automotive and aerospace industries of the world. The basic scientific research, using uncoated ceramic particles, on interactions between ceramics, molten metals and solidifying interfaces initiated in India under the leadership of Prof. Rohatgi has made the synthesis of several new composite materials possible for the first time in the world. The use of aluminium-graphite composites as pistons, liners and bearings has been demonstrated to result in considerable savings of energy in transportation systems, along with savings in imported fuel and materials. Prof. Rohatgi has received several honours for this research from several countries including USA, Japan and UK.

The technology developed at RRL-Bhopal was passed on to the National Research Development Corporation of India last year for transfer to industries, when several enquiries were received

from the Indian industries and from industries in several developed countries. This technology on composite materials represents one of the first engineering technologies developed in India, being sought by developed countries like USA and Australia. □

PERSONNEL NEWS

Appointments/Promotions

Dr P.V.R. Subrahmanyam

Dr P.V.R. Subrahmanyam, Scientist EII, National Environmental Engineering Research Institute (NEERI), Nagpur, has been promoted on assessment as Scientist F (with effect from 1 Feb. 1985).



Dr Subrahmanyam (born 15 July 1932) obtained his Master's degree in Applied Chemistry with first class first in 1954 and D.Sc. in Sanitary Chemistry from the Andhra University in 1961. During 1960-64, he was Assistant Professor of Sanitary Engineering at the All India Institute of Hygiene & Public Health, Calcutta.

With NEERI since December 1964, Dr Subrahmanyam has specialized in water pollution control, wastewater treatment including recalcitrant and hazardous wastes, wastewater utilization for agriculture and biogas from organic wastes.

Dr Subrahmanyam is a recipient of several awards and has held several important positions. These include: Gold Medal for the Best Paper awarded by the Indian Pulp and Paper Technical Association in 1971; Temporary Advisor to WHO

(EURO) and UNEP for the Working Group Meeting for preparation of Guidelines for Toxic and Hazardous Chemical Wastes, at Garmish-Partenkirchen, FRG, during March 1981; Nominated on behalf of UNEP for collecting and compiling information on 'Environmental Capabilities of Institutions in South-East Asia under ESCAP region' during September 1976; Co-principal Investigator (1980-83) for the Indo-US project on 'Analysis, Assessment and Treatment of Toxic Discharges from Phosphatic Fertilizer and Basic Organic Chemical Industries'; Member of the 'Task Force on Biogas Designs', constituted by the Department of Science and Technology, in 1981; Chairman of the 'Techno-Social Committee' constituted by the Central Board for the Prevention and Control of Water Pollution, to review the various aspects of pollution from the Pondicherry Papers Ltd, Pondicherry, during 1981; Technical Coordinator for the national workshop on 'Microbial Degradation of Industrial Wastes' organized jointly by the Department of Environment and NEERI at Nagpur in February 1981; Nominated as an expert to FRG under the Indo-German Collaboration Programme during April-May 1982 to identify R&D institutions and areas of collaborative work in the field of environmental pollution (CSIR-KFA Programme); Member of the Advisory Committee on 'Hazardous Chemical Waste Management Project' constituted by the National Productivity Council and the Department of Environment, during February 1983; Expert on the Advisory Panel to review the draft guidelines on : (i) Toxic wastes (transport, handling and disposal of toxic and dangerous wastes) and (ii) Potentially Harmful Chemicals (International Trade in Potentially Harmful Chemicals), Geneva, 24-25 October, 1983; Invited by the Federation of Asian Chemical Societies to work as Faculty Member for the Pre-conference course on 'Management and treatment of wastes', on 26-28 March 1984.

Dr Subrahmanyam has 65 research and 31 review papers and 60 technical reports in the field of environmental science and

engineering and has presented papers in several international and national conferences and seminars including : Water Industry 1981 held at Brighton, UK, in June 1981; Third International Recycling Congress held at Berlin, FRG, on 18-24 April 1982; Symposium on Chemistry and Environment held at Kuala Lumpur, Malaysia, on 29-31 March 1984; and the 11th Annual Research Symposium of USEPA on 'Land Disposal, Remedial Action, Incineration and Treatment of Hazardous Wastes, held at Cincinnati, during April-May 1985.

Dr Subrahmanyam is a recognized research guide for M. Tech. (PHE) and Ph.D. (Science faculty) of the Nagpur University; Member of the Indian Standards Institution; Editor of the Indian Association of Water Pollution Control (IAWPC) Newsletter and Technical Annual; and Member of the Editorial Board of *Indian Journal of Environmental Health*.

★ ★ ★

At the Regional Research Laboratory, Trivandrum, the following personnel have been promoted, on assessment, from the dates given in parentheses:

From Group IV (3) to IV (4)

Dr A.G. Mathew (27 Jan. 1982) and Dr K.G. Satyanarayana (27 Jan. 1986)

From Group IV (2) to IV (3)

Dr R.M. Pillai and Dr C.K.S. Pillai (both from 20 Dec. 1985)

From Group IV (1) to IV (2)

Smt. Sathyavathi Kutty, Smt. Geetha Ramani, Shri K.C.M. Raja, Shri M. Gopalakrishnan, Dr V. John (all the five from 1 Feb. 1986).

From Group III (4) to IV (1)

Shri D. Thomas (1 Feb. 1985) and Smt. Omanakutty Amma (1 Feb. 1986). □

Honours & Awards

Dr Ashok Jain

Dr Ashok Jain, Director, National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, has been nominated by the Government of India

as a member of the Society of the National Council of Science Museums (NCSM), Calcutta, and a member of the Governing Body of NCSM, for the period ending 31 March 1990.

Dr R. Krishna

Dr R. Krishna, Director, Indian Institute of Petroleum, Dehra Dun, has been elected Fellow of the Institution of Chemical Engineers (UK). He is already a Chartered Engineer of the Council of Engineering Institutions (UK). □

PATENTS FILED

352/DEL/86: An improved process for the production of alumina from alumina bearing ore, waste material & slag, G. Banerjee, D. Narayan, P.K. Jena—Regional Research Laboratory, Bhubaneswar.

353/DEL/86: Improvement in or relating to the manufacture of wall panels using soil/cement/lime and stems of *Ipomoea carnea* (besharam), Navin Chand, A.C. Khazanchi & P.K. Rohtagi—Regional Research Laboratory, Bhopal.

264/DEL/86: Process for the manufacture of organophosphorous compounds for combating pests, Renu Rani, P.N.G. Thyagarajan, U.T. Bhalerrao, M.F. Rahman, P. Grover, M.K. A. Khan & S.S. H. Qadri—Regional Research Laboratory, Hyderabad

293/DEL/86: An improved battery of beehive coke ovens, K. Singh, M. Variakotil, P. Menon—Central Fuel Research Institute, Dhanbad.

282/DEL/86: Process for the preparation of crystalline alumino phosphate catalysts, P. Ratnasamy, S.B. Kulkarni, K.R. Kamble & V.P. Shiralkar—National Chemical Laboratory, Pune.

SENIOR POSITIONS AVAILABLE

CSIR Advertisement No 11/86

It is proposed to appoint one Scientist F for the National Aeronautical Laboratory, Bangalore.

Job Requirements : This is a senior research position and the incumbent is required to lead the crystallography, metal physics and high pressure physics group of the Material Science Division of the laboratory and take responsibility for all R&D activities in these areas. The incumbent will also be required to provide high level leadership in the application of X-ray crystallography with particular reference to metallic materials in regard to their mechanical behaviour. The incumbent will also be expected to provide leadership in the area of high pressure research to develop new materials through phase transformations under high pressure at temperatures and also take up basic research in pressure induced changes in the physical properties. It may also be necessary for the selected candidate to take up administrative responsibilities of the Division as and when deemed necessary by the Director.

Qualifications/Experience : Ph.D. in Physics or Metallurgy with atleast ten years of R&D experience, with sound indepth knowledge in the above fields and should be familiar with current developments in the above fields elsewhere in the world.

Salary/Conditions of Service : The scale of pay attached to this post is Rs. 2000—125/- 2—2500 plus allowances as admissible under the central government rules. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed. Consultancy earning subject to an upper limit of Rs. 15,000 per year is permissible. Free medical aid and leave travel concession are also permissible for the family as per the government rules. Residential accommodation will be provided on payment of usual rent subject to availability.

Age : Preferably below 50 years, relaxable in deserving cases.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this behalf will be final. Applications from employees working in government departments, public sector organizations and government-funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within one month of receipt of the appointment orders.

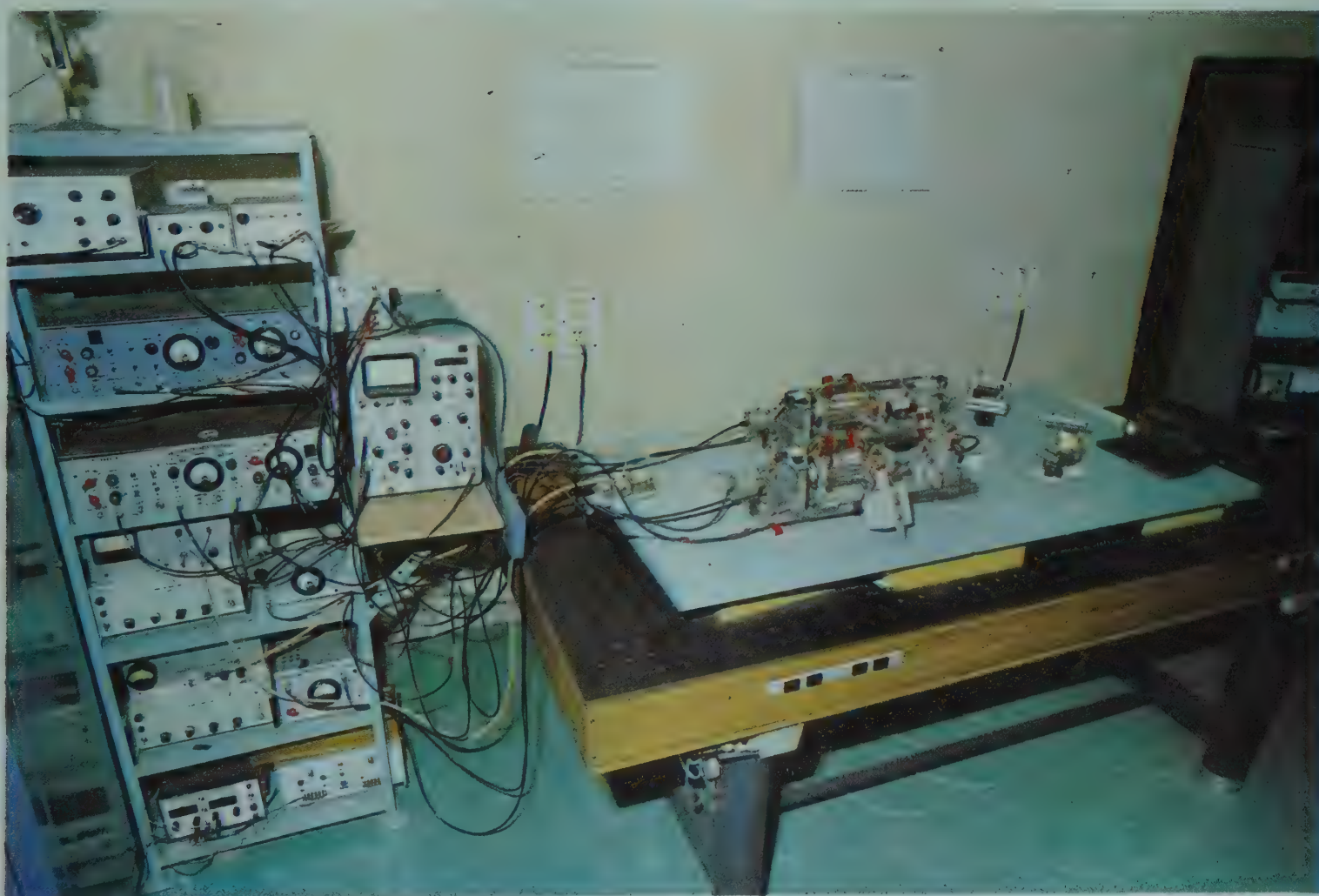
Those interested may kindly send in their curriculum vitae in duplicate in the form obtainable from the Joint Secretary (Admn.), Council of Scientific & Industrial Research, Anusandhan Bhavan, Rafi Marg, New Delhi 110 001 on or before 25 September 1986. Any information about the laboratory can be obtained from the Director of the laboratory. □

CSIR NEWS



A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

VOL. 36 No. 17 & 18 15 & 30 SEPTEMBER 1986



NATIONAL STANDARD OF LENGTH BASED ON IODINE-STABILIZED He-Ne LASER AT NPL

Measurement Standards, Calibration and Quality Assurance Facilities in CSIR Laboratories

Dr Kailash Chandra*

Quality means 'fitness for use' throughout the expected life of a 'product'. In a quality product, the customer looks for proper design, requisite performance, reliability, maintainability, adequate field service, etc. The 'quality assurance' process, which encompasses all activities and functions concerned with the attainment of quality, starts with research, design and development followed by a production strategy in which materials and components of requisite

specifications are used and process parameters are properly controlled. The final products are tested and evaluated for their performance and reliability with adequate back-up of field-service for further improvements in the product design, if required. Standardization of products and processes is also very essential because it aims at reducing the variety and ensures interchangeability of component parts/sub-systems to achieve cost reduction and easy maintainability.

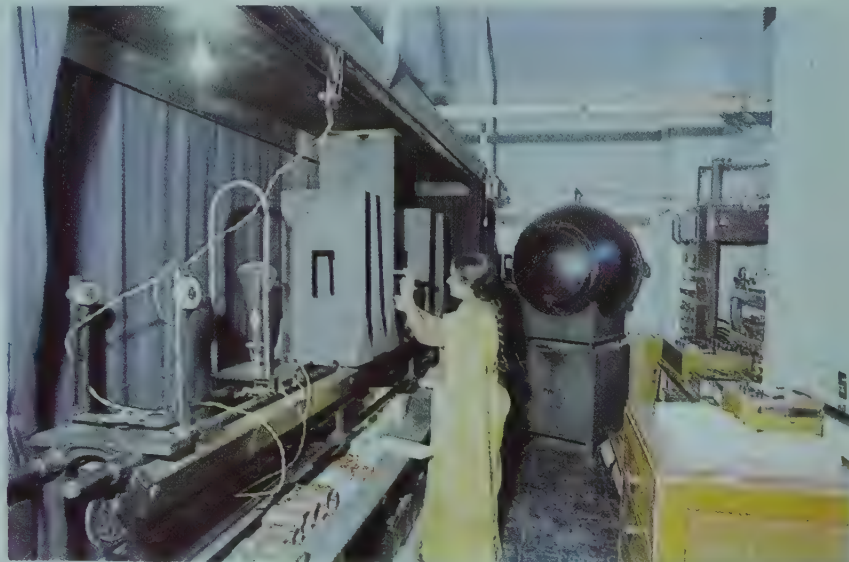
Improvement in quality is a continuous process. In the entire process of quality assurance, accurate measurements play a vital role at every step. New measurement techniques are often instrumental in generating new production strategy and in facilitating innovations and their subsequent utilization. These techniques are getting more and more sophisticated with the advancement of technology, and latest concepts, very close to the frontiers of knowledge, are being used in designing measuring instruments.

Several CSIR laboratories have developed modern facilities for accurate measurements; calibration, testing and

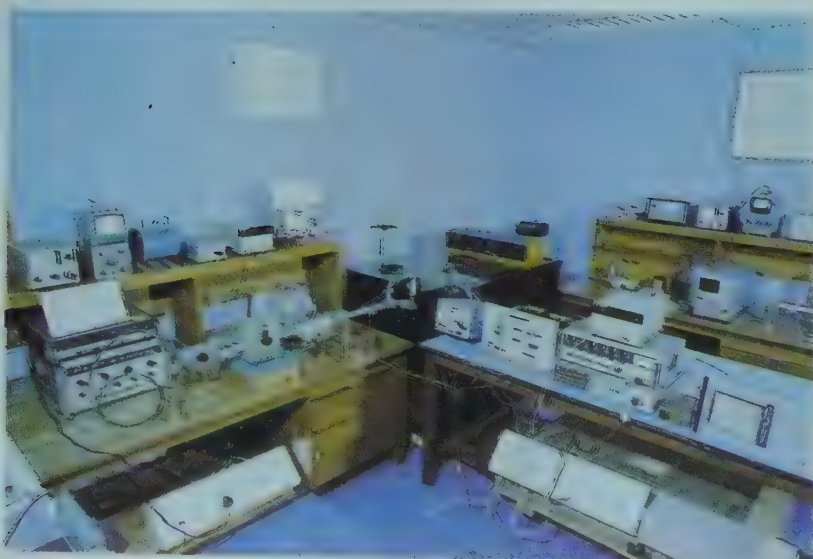
* Dr Kailash Chandra is Acting Director, National Physical Laboratory, New Delhi.



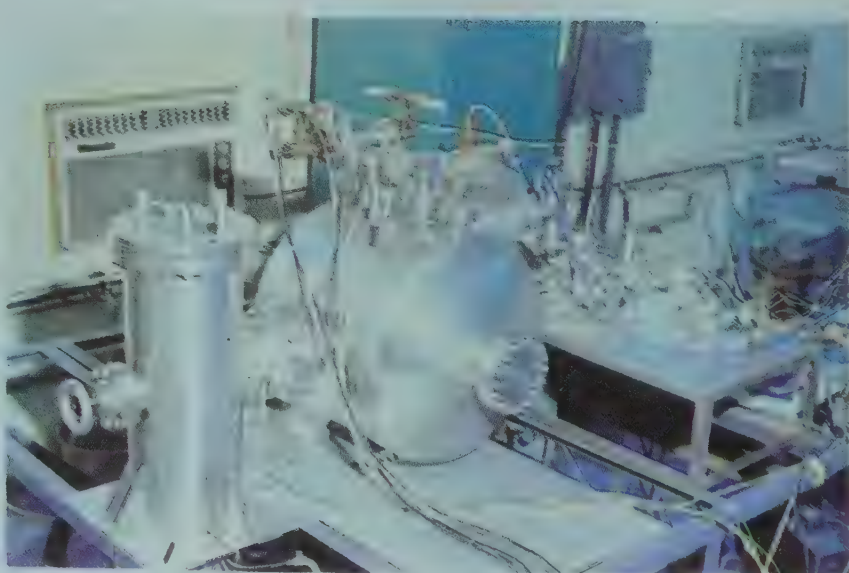
Josephson volt standard



Photometric bench for luminous intensity measurements.



Microwave power standards

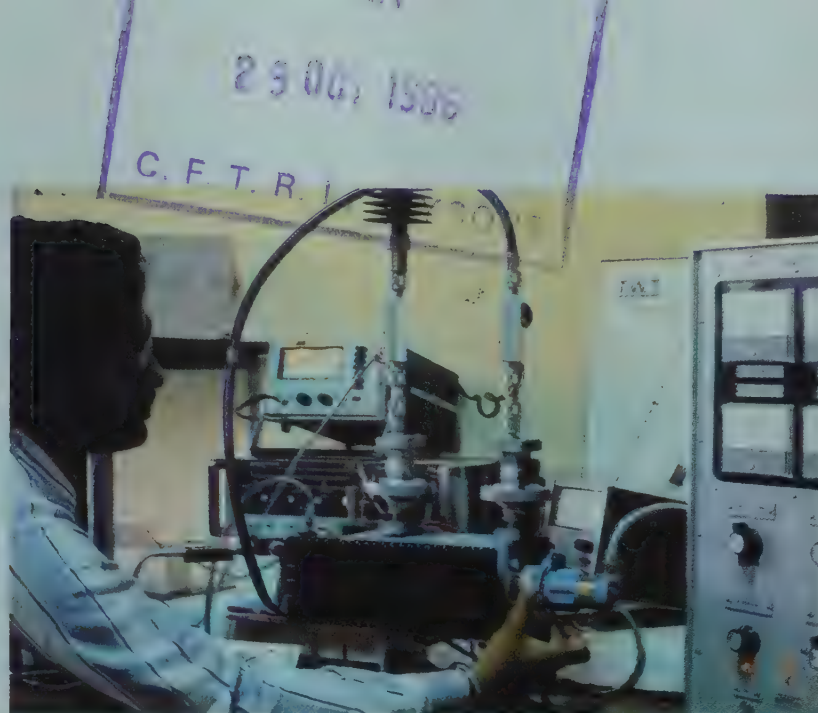


Vacuum standards based on series expansion method

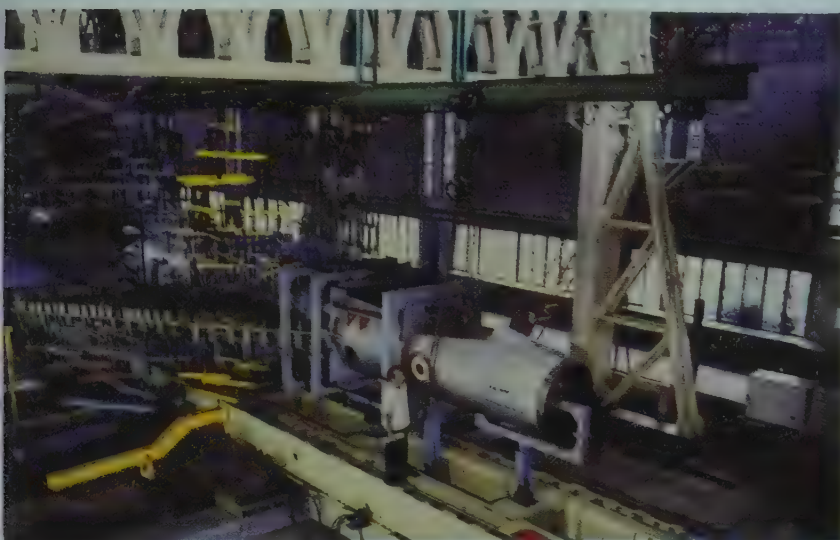
PRIMARY STANDARDS AT NPL



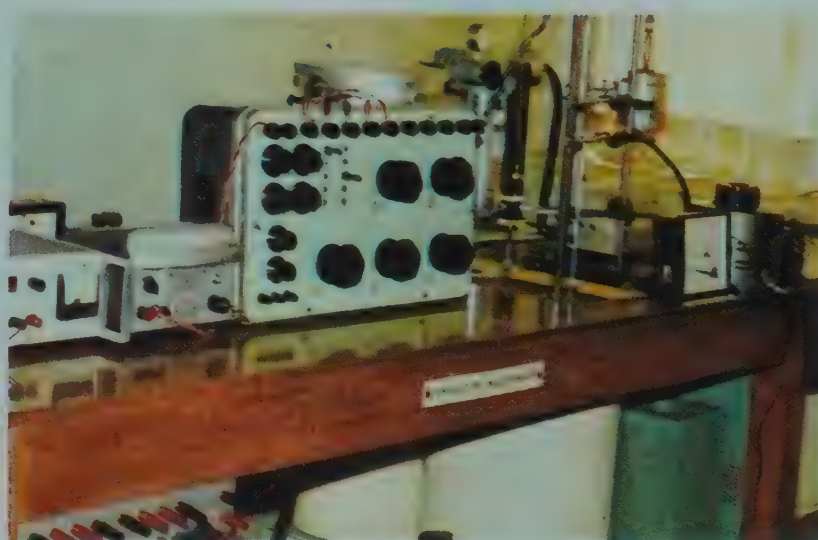
Toxicity tests of plastic material at ITRC



Travelling wave tube testing at CEERI



Fatigue testing at NAL



Temperature calibration set-up at CSIO

evaluation of products and for the development of process control methods needed for quality assurance.

The National Physical Laboratory (NPL), New Delhi, has the responsibility of realizing the 'units' of physical measurements under the International System and of establishment, custody and maintenance of the national standards of measurements representing these units and their multiples. The national standards, maintained at NPL, represent the 'base' units, viz. 'metre', 'kilogram', 'second', 'kelvin', 'ampere', and 'candela' and 'derived' units of force, pressure, vacuum, luminous flux, acoustics and various electrical and electronic parameters. NPL also provides calibration service at the highest level of accuracy. Reference standards and preci-

sion measuring instruments belonging to calibration laboratories of: Department of Weights & Measures, Department of Electronics, Department of Industry, Department of Telecommunications, Civil Aviation, Indian Railways, ISRO, Atomic Energy, Defence and ISI, etc, educational and research institutes and a large number of public and private undertakings are calibrated at NPL. Specialized testing and performance evaluation of products (for which facilities do not exist at other places) are also undertaken.

Other laboratories of CSIR, viz. Central Scientific Instruments Organisation, Chandigarh; Central Mechanical Engineering Research Institute, Durgapur; National Aeronautical Laboratory, Bangalore and Central Electronics Engineer-

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ing Research Institute, Pilani, have also established calibration facilities for specific parameters (Table 1). In addition, many laboratories have specialized testing and evaluation facilities available in various fields such as electronics, optics, chemicals, food, leather, drugs, glass, building materials, etc. (Table 2).

As already mentioned, all materials, components, sub-systems and final products are to be inspected, tested and certified for their conformance to specifications using measuring instruments and gauges of known and guaranteed accuracy. Consequently, a large number of private and public sector undertakings have either established or are in the process of establishing in-house facilities for the calibration of instruments used in production and quality control. Many industries have good in-house testing facilities but they do require independent testing and evaluation of their products and processes to ensure quality and reliability. To ensure that measurement results obtained during the calibration process in various laboratories/industries agree within specified limits (compatibility), it is essential that the accuracy of the reference instruments

Table 1: Measurement Standards and Calibration Facilities in CSIR Laboratories	
Laboratory/Institute	Measurement standards and calibration facilities available
National Physical Laboratory, New Delhi	<p>Realizing the 'units' according to the International Systems; establishment, custody and maintenance of the <i>National Standards</i> (Echelon I) of mass length, time, temperature, luminous intensity, dc voltage and resistance, capacitance, inductance, ac low frequency, high frequency and microwave parameters, pressure, vacuum, force & acoustical standards</p> <p><i>Calibration facilities</i> (Echelon I) related to length, angle, mass, volume and density, time & frequency, thermometry, radiometry and photometry, force, vacuum and pressure, d.c., a.c., low frequency, high frequency and microwave measurements up to 26.0 GHz</p>
National Aeronautical Laboratory, Bangalore	Pressure, vibration and force measurements (Echelon II)
Central Scientific Instruments Organisation, Chandigarh	D.C. (voltage, current and resistance), A.C. (voltage, current), capacitance, frequency and temperature measurements (Echelon II)
Central Mechanical Engineering Research Institute, Durgapur	Dimensional metrology, angle, surface-finish, pressure and vacuum measurements (Echelon II)
Central Electronics Engineering Research Institute, Pilani	Some facilities for d.c., high frequency and microwave measurements

used in calibration should be traceable to the national standards of measurements (traceability).

To achieve 'compatibility' and 'traceability' in calibration and testing throughout the country, a well coordinated

national measurement system is needed. For this purpose, the Government of India has approved a scheme entitled 'National Coordination of Testing and Calibration Facilities' (NCTCF) which is now being implemented by the Depart-

Fig. 1: TRACEABILITY OF ACCURACY IN MEASUREMENTS UNDER THE CALIBRATION SERVICE PROGRAMME OF NCTCF

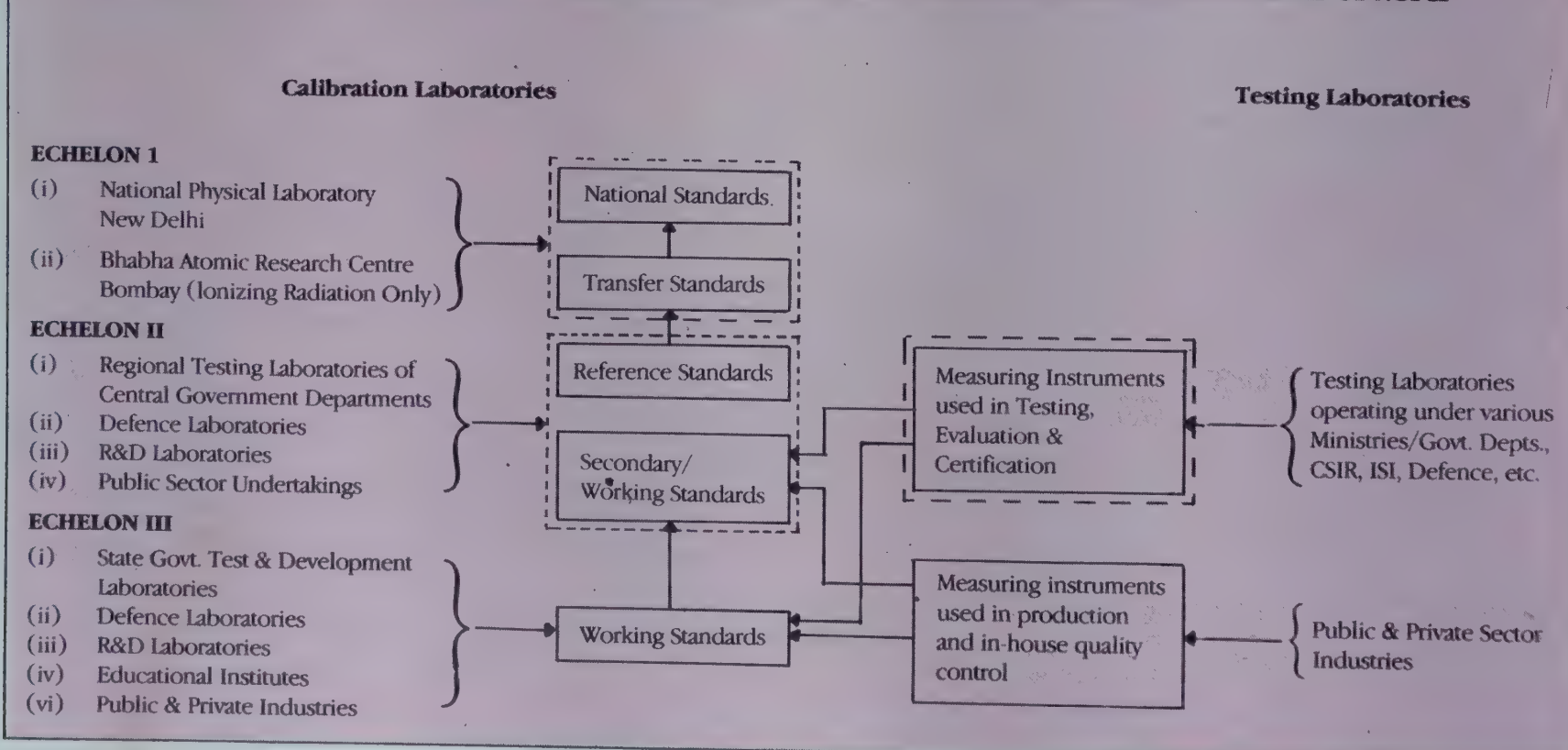


Table 2: Testing & Evaluation Facilities in CSIR Laboratories

Laboratory/Institute	Facilities available
National Physical Laboratory, New Delhi	Characterisation of electronic and other materials, solar Cells, materials for solar energy applications, acoustic and ultrasonic materials and devices, optical materials and luminaires, thermal-insulation materials, etc.
Central Electronics Engineering Research Institute, Pilani	Semiconductor devices, special purpose microwave tubes, process control instruments, TV components and acoustic devices
Central Scientific Instruments Organisation, Chandigarh	Electronics, optical, medical and process control instruments, holographic and metrological gratings
National Chemical Laboratory, Pune	Inorganic, organic chemicals, polymers, industrial chemicals. characterization of materials
Indian Institute of Petroleum, Dehra Dun	Petroleum and their materials & products
Central Drug Research Institute, Lucknow	Drugs and their constituent materials
Central Food Technological Research Institute, Mysore	Food and related materials
Central Leather Research Institute, Madras	Leather and its related products, leather machines, waste material articles, etc.
Industrial Toxicology Research Centre, Lucknow	Materials for occupational & environmental health problems
Central Glass and Ceramic Research Institute, Calcutta	Glass, ceramics, refractories, vitreous enamels, mica, etc.
National Metallurgical Laboratory, Jamshedpur	Ores, minerals, refractories, ferrous and non-ferrous metals & alloys
Central Road Research Institute, New Delhi	Materials used in road engineering, failure analysis
Central Building Research Institute, Roorkee	Building materials & fire retarding materials
Central Mining Research Station, Dhanbad	Mine engineering explosives and safety equipment
Central Mechanical Engineering Research Institute, Durgapur	Materials and products related to automobile engineering, heat, power, refrigeration, dimensional measuring instruments, etc.
National Environmental Engineering Research Institute, Nagpur	Instruments for air pollution and control, water chemistry & other environmental protection, material analysis
National Aeronautical Laboratory, Bangalore	Materials, structures and instruments related to aeronautical industry
Structural Engineering Research Centre, Madras	Materials and pre-fabricated structures related to residential, industrial and institutional buildings and off-shore structures
Regional Research Laboratory, Jorhat	Applied civil engineering, bio/inorganic/organic chemistry, geosciences, petroleum & natural gas

ment of Science and Technology. Under the Calibration Service Programme of this scheme, the calibration laboratories operating under various agencies will be approved in three Echelons depending upon the level of accuracies as outlined in Fig. 1. NPL and the Bhabha Atomic Research Centre, Bombay (for ionizing radiation only) are categorized as Echelon I laboratories and regional laboratories of the various government departments, laboratories of CSIR and other R&D laboratories and a few organized industries will be approved as Echelon II laboratories. Test laboratories of state governments, R&D laboratories, educational institutes and industries will be grouped as Echelon III laboratories. Precision instruments of testing laboratories and those used by the industries in their quality control laboratories should be periodically calibrated at the appropriate level (Echelon I, II or III). The responsibility of coordination of the entire calibration activity in the country under the NCTCF programme has been entrusted to NPL. This will ensure traceability of the accuracy of all measuring instruments to the national standards of measurements maintained at NPL. The traceability of national standards to international standards is ensured through periodic international calibration and intercomparisons.

Industries and other user agencies should make full use of the above mentioned facilities established in CSIR laboratories. Many of these laboratories are well equipped to provide assistance in the following areas;

- Precision measurements & calibration
- Formulation of specifications
- Testing, evaluation & certification of materials, components and products
- Design, tooling, instrumentation and process control (to meet product specifications) and further improvements
- Training & refresher courses in precision measurements, testing, evaluation, certification, etc.

□

Computer Software for Building Problems

The Central Building Research Institute (CBRI), Roorkee, has been engaged in research and development on various aspects of buildings for almost four decades now. The institute has developed several computer programs from time to time for providing analytical backup to some of its research projects. Apart from a few structural engineering software, it has developed programs for analysis of thermal performance of building components, analysis of performance and design optimization of lime shaft-kilns, etc. These programs are well tested and have been successfully used in quite a few consultancy projects handled by the institute for various organizations. A brief resume of the programs highlighting their capabilities and input/output is given below:

STRESS

This program can solve plane stress/ plane strain/axi-symmetric continuum problems by 'finite element method' using isoperametric elements under static loads and linear material behaviour. The input requirement is the topology of discretized continuum, connectivity of elements, boundary conditions and loading. The output is nodal displacements and stresses at gaussian integration points or at element nodes.

STRSJT

This is an updated version of the above program and can take care of non-linear material behaviour and discontinuities/joints/interfaces in the continuum. The input/output is the same as that for STRESS.

SFP

The Space Frame Analysis (SFP) program can analyze two- and three-dimensional building frames under static loading of almost all kinds and is based on stiffness matrix method. The input is similar to STRESS and output gives nodal deformations and nodal and midmember bending moments, axial forces and shear forces.

LKD

This is a program for performance analysis and design optimization of lime shaft kilns through simulation technique. It analyzes the three zones, viz. the preheating-cum-devolatilization zone, the burning zone, and the cooling zone. It incorporates the effect of important design and operational parameters, such as, type and size of lime stones, proximate analysis and size of coal particles, lime stone to fuel input ratio, specific product output rate, excess air, and kiln height to diameter ratios. This software attempts the prediction of temperatures of fuel, stone and bulk gas vis-a-vis the degree of calcination of lime stone and combustion of coal along the axis of the kiln.

PERV

The program evaluates the thermal performance of wall and roof sections for a given climate. The input required is in the form of thermophysical properties like thermal conductivity, density and specific heat. The data on drybulb tem-

peratures for a period of 24 hr (minimum), hourly solar radiation, vapour pressure and wall/roof surface colour are also fed to the program. The output is in the form of hourly internal surface temperatures and hourly heat flows through the wall/roof section. An index to evaluate the thermal performance (TPI) and class in which the section is being categorized also come as output both for unconditioned and conditioned situations. Program is available in FORTRAN language.

DEC

For the Direct Electric Curing of *in-situ* concrete components, it is essential to ensure that the temperature rise is uniform. To arrive at minimum number of electrodes distributed in a particular configuration to give the best uniformity of temperature in a concrete component, a computer software based on 2-dimensional heat flow and finite element method has been developed. The software also computes the average temperature rise in the component. The program has been extended to theoretically work out the requirements of total energy.



SN-73 computer



Colour graphic terminal and plotter

NOISE

The noise level prediction in an industrial enclosure provides a relatively cheap and quick means of examining the likely effect of a variety of potential noise control measures. For predicting noise levels with high degree of accuracy, based on modified shield's model for continuous, non-varying sound sources, a computer software has been developed. The program can also be employed for predicting sound levels at prescribed observation points by classical room equation. Sub-routines in the program give the overall noise level from band level and attenuated sound levels provided by a pair of corridor type partial barrier.

SHEAR

The program can analyse multipanel in-situ and prefabricated shear walls with linear material properties. The two dimensional problem of shear wall has been converted to a one dimensional beam problem by introducing a new partially bonded beam element. The input data are the topology of discretized continuum, connectivity of elements, bound-

dary conditions and the loading. The outputs are nodal displacements, bending moment and shear force at the joint/lintel opening.

All the above programs are written in FORTRAN. The programs can be had by the interested parties who may write to the Director, CBRI. □

Online facility at NAL to access the databases of ESA

The European Space Agency (ESA) has set up an international information network (ESANET) based on a central main-frame computer in Frascati, Rome, Italy. ESANET has more than 70 databases/databanks containing in all 35 million abstracts of literature in all branches of science and technology and other fields. During November 1976, the Indian National Scientific Documentation Centre had arranged a demonstration of online access to ESANET, at TIFR, Bombay. Similar demonstrations were held in New Delhi and at the National Aeronautical Laboratory (NAL), Bangalore, during March 1981. Encouraged by the success of these demonstrations, it was decided to set up an online retrieval facility at NAL on an experimental basis for a period of six months, as a cooperative project with the support of other user organizations.

In response to NAL's request sent through the Chairman, ISRO, (which is the counterpart agency for ESA in India), ESA has since set up and commissioned two high-speed terminals at NAL.

The terminal equipment consists of 2 IBM PC/XT microcomputers 2 modems, 2 printers and one X-25 PAD (to support



On-line facility at NAL to access the databases of ESA

up to 8 terminals). All these items of equipment have been provided by UNESCO to NAL under the ASTINFO programme.

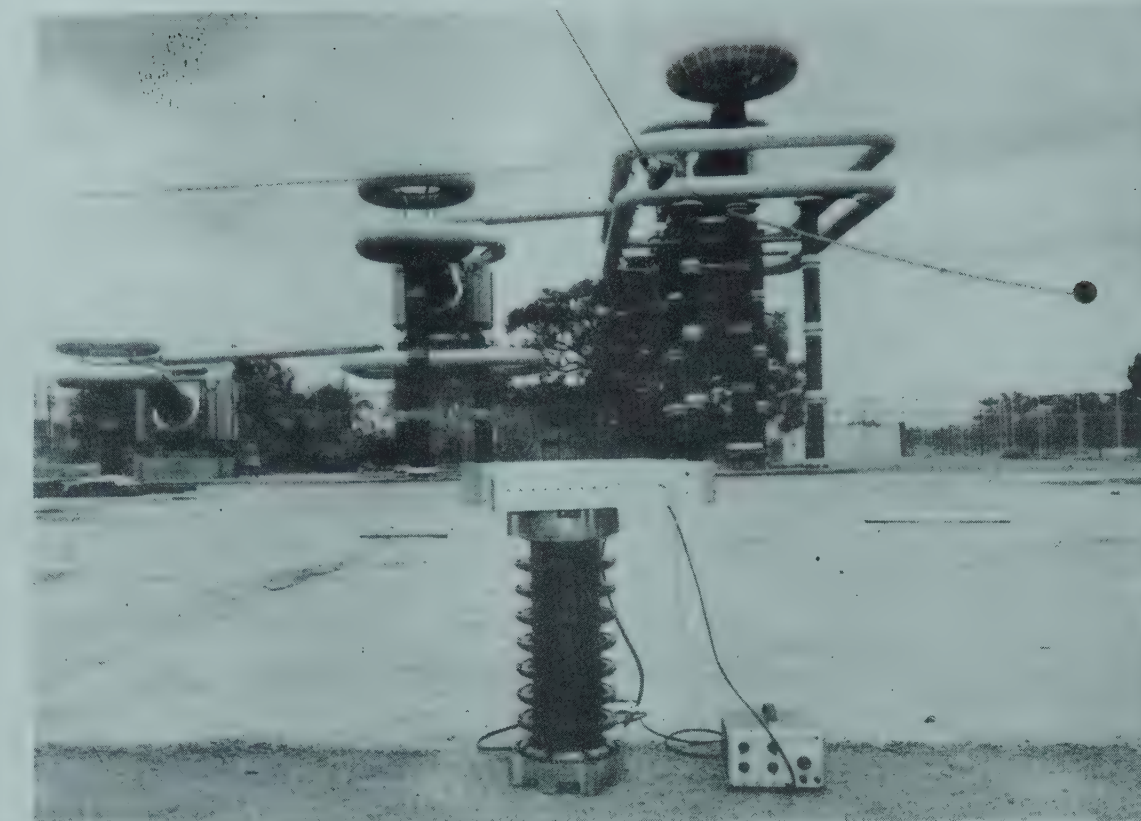
The terminal equipment is linked to ESANET via a high-speed (2400 bps) dedicated telecommunication link from NAL to Bombay over the national microwave circuit and from Bombay to Rome via satellite (INTELSAT). The databases are accessed by ESA-QUEST, a versatile user-friendly and menu-driven retrieval software provided by ESA. CSIR laboratories and institutes, DRDO, ADA, BEL HMT and other organizations are eligible to use the facility for bonafide research and study. The facility is available for use from 9.00 a.m. to 5.00 p.m. Monday to Friday (extension up to 10.00 p.m. is possible). No commercial use of the facility is permissible.

The 'connect-time' costs for accessing the databases will be about Rs. 700/ query including online printing up to 50 bibliographic citations. Users in Bangalore can visit NAL and make use of the facility. Users outside Bangalore can send in details of their search queries by telex (0845-279 NAL IN), telephone (574262), telegram (NAEROLAB, Bangalore) or post (Head, Information Centre for Aeronautics, National Aeronautical Laboratory, P.B. No. 1779, Bangalore 560 017).

Brochures and additional information can be had from: The Director, (Attn: Shri M.N. Seetharaman, Head, Information Centre for Aeronautics), NAL.

Fiberoptic telemetry system

A 10-channel fiberoptic telemetry system developed at the National Aeronautical Laboratory (NAL), Bangalore, can be used for transmitting data generated at one point to another remote location. The Central Power Research Institute (CPRI), Bangalore, which was referred the problem of evaluating the performance of the fiberoptic telemetry, con-



The set-up established at CPRI to evaluate NAL's 10-channel fiberoptic telemetry system. The transmitter (foreground) was placed within a few metres of the RFI & EMI generating unit (background) and the lightning effect was generated. A fiberoptic cable coupled the transmitting and receiving units



Van housing the receiving unit

ducted various tests on the system, including one to determine the effects of lightning on the fiberoptic link.

In its report, CPRI has concluded that (a) there is no distortion in the waveform at the output of the receiver and (b)

some distortion is observed when the top cover of the transmitter is removed. Still, the shielding provided is adequate.

The complete know-how documents are available to parties interested in productionizing this technology. □

Sulphur Dioxide Exposure Chamber

The National Status Report published by the Department of Environment on the effect of atmospheric pollutants on plants points out towards the non-availability of an exposure chamber for experimental evaluation of plants. Keeping this in view, the Industrial Toxicology Research Centre (ITRC), Lucknow, has developed a continuous flow exposure chamber. The chamber is indigenously designed and can be fabricated by any laboratory at a low cost for the evaluation of plants for their sensitivity/resistance towards SO_2 , a common industrial pollutant. The blue print of the chamber and its allied assemblies has been published in *Environmental Pollution* Vol. 39, No. 3 Ser. A (Elsevier Applied Science Publishers).

The chamber is made from transparent perspex sheet. It consists of a base with grooves to accommodate the detachable top. Liquid paraffin in the grooves makes the chamber air-tight. To prevent heat and infra-red radiation, the light provided by an overhead reflectorized 1000W bulb, is filtered through water flowing in the tank built on top of the chamber. The walls of the chamber are provided with gas inlet, outlet and a small fan having a speed of 1500 rev/

min. which results in an air speed of 0.54 m/s in the centre of the chamber and negligible boundary layer resistance.

SO_2 is produced by passing a current of air in an aqueous solution of sodium metabisulphite. The concentration of SO_2 generated depends on the concentration of the sodium metabisulphite solution, temperature and rate of bubbling. The concentration of SO_2 within the chamber may be determined by sucking air from the middle of the chamber through an aspirator in a 0.1M solution of sodium tetrachloromercurate. The air coming out of the chamber is bubbled through the water trap to avoid any release of SO_2 in the air.

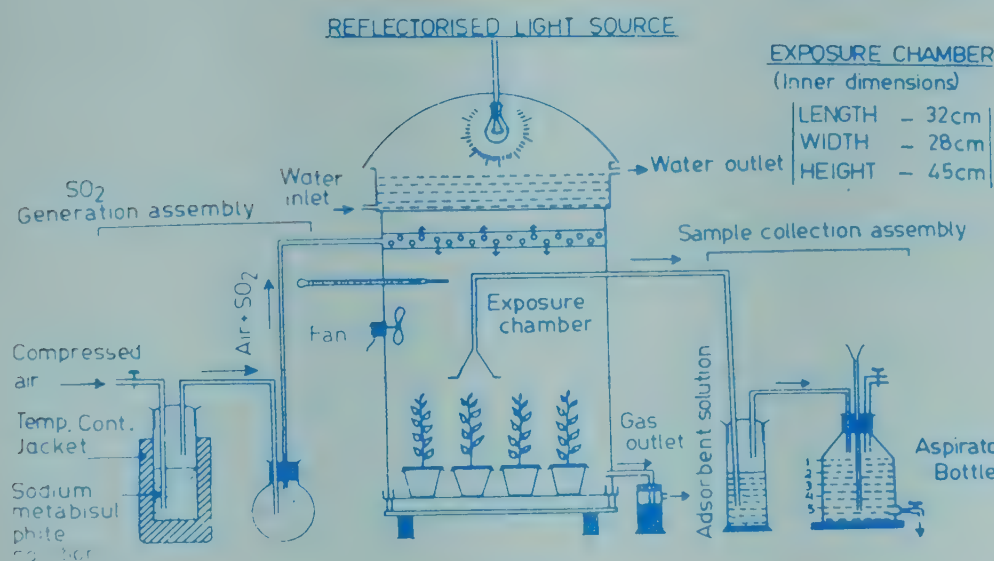
Using this chamber, tree saplings of guava, tamarind, *peepal*, *chilbil*, *pakar* were exposed to different doses of SO_2 and their relative susceptibility and resistance were determined. As a result of these studies plantation of *peepal*, *pakar* and *chilbil* was recommended for creation of green belts around industries. In *imlis* saplings, injury ratio was found to be considerably high. Thus, they would not be suitable for plantation in areas where SO_2 is the primary pollutant. Trees like guava and *peepal* were found effective in depleting atmospheric SO_2 concentration. Large number of tree saplings are in a process of evaluation. □

Exhibition on Drinking water and Water Management

Several CSIR laboratories have directed considerable amount of their research efforts to solving the problems pertaining to availability of drinking water and water management. The laboratories making significant contributions in the field are: National Geophysical Research Institute, Hyderabad; Industrial Toxicology Research Centre, Lucknow; Central Glass & Ceramic Research Institute, Calcutta; Central Scientific Instruments Organisation, Chandigarh; National Environmental Engineering Research Institute, Nagpur; Central Salt & Marine Chemicals Research Institute, Bhavnagar; Central Mechanical Engineering Research Institute, Durgapur; Structural Engineering Research Centre, Madras and Central Building Research Institute, Roorkee. Well before the subject was assigned the role of a major technology mission, it has received the thrust from researchers in national laboratories.

The Council organized an exhibition on Drinking Water and Water Management Programme of CSIR at Vigyan Kendra, New Delhi, on 1 August 1986. The exhibition displayed CSIR technologies for ridding the water of various contaminants, industrial effluents and wastes, disease-producing organisms, fluorides, metallic ions, etc. posing danger to the health of city and rural population, and the monitoring equipment and other instruments and techniques for finding new sources of water.

Shri D. Bandyopadhyaya, Secretary, Department of Rural Development, Ministry of Agriculture, who inaugurated the exhibition, mentioned in his address the use of old technologies of water conservation practised in Indian villages. He warned that unless immediate steps were taken to stop indiscriminate felling of trees even groundwater will become scarce in future. He disclosed that one district each in 10 states, which faced water scarcity, had been identified for water resource development in the current year. Next year, another 12 districts would be taken up. Technologies to be used for these projects are totally indigenous and have been developed by CSIR.



Sulphur dioxide exposure chamber

Dr A.P. Mitra, Director General, CSIR, highlighted the Council's achievements in the field. He explained that the CSIR's work on water could be divided in four areas. First was the purification of the water. The second related to technologies meant to ensure the availability of toxicologically acceptable water through appropriate treatment. He laid great stress on this aspect and said that the Ganga Action Plan also had the same objective. The third part concerned monitoring equipment, which could be usable at all places. The fourth aspect was the finding of new resources of water.

Dr S. Varadarajan and Prof. T.N. Khoshoo also addressed the gathering. □

PROGRESS REPORTS

NEERI ANNUAL REPORT: 1985-86

The annual report of the National Environmental Engineering Research Institute (NEERI), Nagpur, for 1985-86, shows that the major thrust of the laboratory continued to be on: Biotechnology application in environmental science and technology; Environmental impact analysis and development of methodologies for core sector industries; Systems analyses and computer applications; Technology/technique development; and Wastewater management for resource conservation and reuse.

The institute investigated 67 projects, comprising 18 sponsored/contract research and 49 in-house schemes. The new projects pursued during the year included those related to: Speciation of sulphur in sulphurous waters, Validity of BOD determination at elevated temperatures, Formulation of emission factor (including fugitive) with and without control equipment for scheduled industries and optimization analysis of respective major control equipment, Development and testing of high efficiency scrubbing system for combustion boilers for simultaneous absorption of SO_x and NO_x , Large scale application of water desalination and evaluation of indigenous reverse osmosis and electro-dialysis technologies, Defluoridation of water,

Field testing of iron removal technology, Improvements in efficiency of unit processes in water treatment with reference to rapid mixing in flocculation process, Preventive maintenance of water distribution system and waste assessment, Evaluation of an improved rotating biological contactor (RBC) technology for waste water treatment, Treatment of dairy waste by rotating biological drum contactor, Treatment of wastewaters from organic chemical industries containing high nitrates by anoxic methods, disposal of hazardous wastes by molten salt combustion technique, Dissolved air floatation technique for solid-liquid separation in the treatment and recycle of industrial wastes, Toxic metals in environment —their effects, removal and disposal, Integrated environmental pollution control system with energy recovery in Hindon basin, Monitoring of Nagin lake water quality for Srinagar Water Supply Scheme, Biological monitoring of water pollution-ciliated protozoa and algal colonisation on artificial substrate for assessing aquatic environment, and Development of computerized data-handling system for manpower and project planning in environmental research.

The institute along with its zonal laboratories at Delhi, Kanpur and Calcutta formulated a plan for participation in the national mission project: 'Prevention of pollution and cleaning of river Ganga. The five-year programme of NEERI covers: (i) Assessment of physico-chemical, bacteriological and biological quality of water with special reference to health related parameters; (ii) Pollution assessment from municipal and major industry sources; and (iii) Demonstration of pollution control technology including recycle and reuse.

Under the National Air Quality Monitoring Network Programme being conducted by NEERI data are provided to national and international agencies. These data are useful in establishing threshold limits for common air pollutants such as SPM, SO_x , NO_x , sulphation rate and dust fall for adoption in the country. SAROAD (Storage and Retrieval of Aerometric Data) format used in Global Environ-

mental Monitoring is adopted in coding the NAQMN data. Statistical data giving the diurnal pattern, daily and monthly 24-hour averages of the pollution levels are produced in the printed form.

Impact studies of stack and fugitive emissions from select industries, namely, foundries, steel plants, copper complex, cement industry, paper mills were made. The quality and quantity of the emissions and their impact in and around these industries were evaluated for instituting appropriate control measures.

The Expert Committee appointed by the Government of India (July 1974) entrusted NEERI the task of establishing air quality data preceding and following the commissioning of the refinery at Mathura. The air quality monitoring programme provides data on pollution trend in ambient air around Taj Mahal from January 1981. The refinery was commissioned in May 1983. The data on SPM, SO_x , and NO_x covering diurnal, seasonal and annual trends were submitted to the Central Board for Prevention and Control of Water Pollution. The work was concluded in March 1986.

Out of the probable technologies, reverse osmosis (RO) and electrodialysis (ED) have been identified as the technologies for field trials by the 'Working Group' constituted by the Government of India. Four RO and four ED units, one each in the states of Rajasthan, Gujarat, Andhra Pradesh and Tamil Nadu, were installed for field investigations. The Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, has provided two RO and two ED units; Defence Research Laboratory (DRL), Jodhpur, has provided two ED units; and Bhabha Atomic Research Centre (BARC), Bombay, has supplied two RO units. The first round of performance evaluation of these RO and ED units was completed by NEERI. The cost and maintenance aspects of these units would be confirmed after the second round of performance evaluation during 1986-87.

On behalf of the Public Health Engineering Department of Jammu & Kashmir State, NEERI monitored the water quality of Jhelum river, Nagin and Dal

lakes for augmenting the water supply of Srinagar.

A three-year study on baseline data on the heavy metals like cadmium, copper, chromium, lead, iron, manganese, nickel and zinc showed that these metals are within permissible limits though there is a definite increase in the levels in the water sources of Delhi, Kanpur and Calcutta. Similar trend was observed in another three-year study on the levels of organochloride pesticides like aldrin, dieldrin, DDT and lindane in the water sources of these cities.

Under a CSIR-coordinated project undertaken with a view to evaluating the feasibility of utilizing water in abandoned chromite quarries and provision of safe drinking water in mines, colonies and adjoining areas, studies were conducted at chromite mines at Kaliapani, Orissa. The water in the areas was aggressive with low pH and contained hexavalent chromium and other toxic metals. A treatment process was developed to make the water potable.

A new technique of using electrical method for determining velocity gradient in water treatment was developed. In the conventional torque method, torque meter indicates power input.

Based on the know-how supplied, a number of treatment plants have been set up in the country to meet the regulatory standards in the past. Treatment plant designs were supplied to the Explosive Factory of The Indo-Burma Petroleum Co.; Hindustan Organic Chemicals; Nitrogenous Fertilizer Factory of FCI; BHC manufacturing Factory; and Dye waste treatment for Central Coir Research Institute; Energy recovery from distillery waste through anaerobic treatment 1m³/day pilot plant.

Rotating biological rope contactor is a new step in wastewater treatment technology which received the best invention award at the 46th All India Industrial Exhibition in February 1986. The unit has been tested extensively in the laboratory, and attempts are being made to translate it into the field.

The institute has initiated R&D activities in hazardous waste management which has now assumed a very important

dimension in the area of environmental pollution control. Molten salt combustion for pesticide wastes and anoxic systems for high nitrate bearing organic wastes were being tested on bench scale.

A flow sheet was evolved using bench top laboratory model working units to remove toxic organic pollutants including colouring compounds and ammonia nitrogen from the LTC (low temperature carbonization) wastewater. The specific microbial cultures for detoxification of phenol were successfully field tested in recommissioning an LTC wastewater treatment plant.

A microbiological method was developed to remove colour and lignin from pulp and paper mill wastewater using penicillium sp. This fungus grows in presence of glucose and removes the colouring material with 80-90% efficiency.

A new and cheap method using bituminous coal was developed for concentration of enteric viruses from water and sewage. Modified organic flocculation method for concentration of enteric viruses from sewage was developed and standardized.

Microbial detoxification of an organophosphorous pesticide, Malathion, was established and toxicity of some of the chlorinated hydrocarbon pesticides with specific reference to fresh water algae was studied.

The evaluation of toxicity to aquatic flora and fauna with specific reference to some heavy metals in environment was in progress. The biological monitoring of water pollution using substrates was being standardized and evaluated.

A comprehensive study was undertaken at Bombay Port Trust to assess the existing levels of pollution and its impact. Suitable control and remedial measures were suggested for implementation.

The institute assisted several agencies in planning technology packages for solid waste management. The accomplishments include: (a) Development of an algorithm with the help of systems analyses technique to arrive at planning criteria for selection and allocation of disposal sites; (b) Submission of an interim report identifying the areas in Varanasi for use as sanitary land-fills, to Cen-

tral Ganga Authority; and (c) Development of a method to determine the velocity patterns in the digestors of solid wastes by different mixing modules.

Using an 8-bit micro-computer (HCL S-2), the institute undertook (a) Software development for various scientific applications, (b) Operation and maintenance of the Aerometric Data Handling System to store, retrieve, analyze and print reports for the NAQMN program; (c) Development of Personnel Information system for R&D management, using the DBMS package dBASE II; (d) Development of an R&D project monitoring system; and (e) Development and implementation of a new transaction-based pay roll package for the institute. □

PATENTS ACCEPTED

156909: An improved process for the preparation of pure urea stibamins—Indian Institute of Chemical Biology, Calcutta.

156912: An improved anticorrosive paint particularly useful as primer in marine environment—Central Electrochemical Research Institute, Karaikudi.

157165: A dust arrestor device for large diameter deep hole drilling for open cast mines—Central Mining Research Station, Dhanbad.

157261: An improved process for casting of aluminium or aluminium alloys to obtain fine grain refining thereof—National Metallurgical Laboratory, Jamshedpur.

157264: Apparatus and method for the simultaneous production of hydrogen and carbon monoxide separately as gaseous mixture—National Metallurgical Laboratory, Jamshedpur. □

PERSONNEL NEWS

Appointments/Promotions

Dr A. Ghosal

Dr Amitava Ghosal, Scientist (Operational Research), CSIR, has been promoted as Scientist F with effect from 31 August 1983. He joined the CSIR services as JSO at the Central Fuel Research Insti-

tute, Dhanbad, on 8 June 1983 and set up a viable statistics department there. In 1963 he came to the CSIR Hq. at the instance of late Dr S. Hussain Zaheer (DG) and set up, with Prof. A. Rahman, the Operational Research Unit which with several changes in names became the present Planning Division. Dr Ghosal joined the Manpower Division in 1978 with exclusive charge of doing operational research studies for the CSIR laboratories (consultancy and sponsored studies).



Dr Ghosal served as a Senior Lecturer in Mathematics (O.R.) at the Monash University, Australia (1967-70), and as a Professor of Management Science at the City University of New York (Graduate Centre and Baruch College), 1974. He was also a Visiting Professor at the Royal Military College of Canada (1980), and a Distinguished Lecturer at the Summer School of Cybernetics at Mexico (1981).

Dr Ghosal is internationally known for his work in applied stochastic processes (queues and dams) and applied cybernetics. He has been chairperson in sessions in various international conferences. He is author of numerous research papers in international journals. Among his important publications are: *Some Aspects of Queueing and Storage Systems* (Springer Verlag 1970), *Examples and Exercise in O.R.* (Gordon & Breach, London, 1975), *Applied Cybernetics* (Gordon & Breach, London 1978, translated into Russian, 1982), *Pragmatic Cybernetics* (edited: 1986).

On behalf of CSIR, Dr Ghosal has been a consultant to many public sector organizations. At present he is the Project-in-

charge of the Natural Resources Data Management System (OR), a sponsored project of the Department of Science and Technology. He also advises organizations on technological forecasting.

Dr S. Guruviah

Dr S. Guruviah, Scientist EI and Head, Industrial Metal Finishing Division, Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted as Scientist EII (w.e.f. 1 Sep. 1985). Dr Guruviah took his B.Sc. degree from the Madras University and M.Sc. from the Banaras Hindu University. He obtained his Ph.D. degree for his studies on corrosion prevention by organic and metallic coatings and inhibitor. He started his research career in CECRI, in 1958 after teaching for one year in a private college. At CECRI, he has developed processes for the preparation of calcium chromate, zinc phosphate pigments and paints and zinc-rich paints for corrosion protection. A radiation-resistant protective coating system for nuclear power station (sponsored by BARC) was developed as a substitute for imported paints. The paint passed the irradiation resistance tests. A sodium zinc silicate primer was developed. It passed the welding tests without any defect in the joints. This will reduce the import of paint and save foreign exchange. A rust converter for painting on rusty steel was developed; the know-how has been transferred to five parties.

Dr Guruviah has completed 14 advisory consultancies and six sponsored projects relating to various protective schemes for government, semi-government organizations and private sectors. A CSIR-SAIL project on coating for gas pipe line and failure analysis of pipe was completed. An automatic SCR control unit was developed to control the potential; the unit can be used for both anodic and cathodic protection schemes. A solar collector was used for charging the battery and this will supply current for cathodic protection.

Dr Guruviah has also carried out intensive research work on bright plating of nickel, zinc, tin and gold. A process (10-

litre scale) on electrolytic refining of secondary tin was completed and handed over to industry. Large scale (250 kg) copper refining was carried out and selenium and tellurium collected in the anode mud for the Defence. Ruthenium coating was deposited on titanium substrate and diffused by annealing to serve as anode in chemical industries. The performance of metal sprayed, hot dipped, electroplated, conversion coatings was evaluated in various electrolytes by electrochemical methods and accelerated tests were carried out to understand the mechanism of protection of the coating.

He visited UK during 1968-69 under the Colombo Plan and carried out research work on ionic conduction through paint film and diffusion of oxygen and water through paint film at the Cambridge University and the Paint Research Station, Teddington. He has published more than 150 research papers and has taken out 21 patents. Six of his processes have been released to industry. He has served as Member of ISI; Metal Finishing, VSSC Trivandrum; Corrosion Advisory Committee and Executive Council, CECRI. He is a recognized research guide of the Madurai Kamaraj University, Madurai and Bharathidasan University, Trichy. He was Convenor of the two symposia: Advances in Corrosion Control and Industrial Metal Finishing. He worked as co-ordinator for the long-term courses on Corrosion and its prevention and Industrial metal finishing.

His current interests are related to the development of brushable water soluble air drying stoving paint, cathodic electropainting, high build coatings, powder coatings, painting on wet surfaces, conversion coatings, diffusion coatings, electroless alloy plating and evaluation of the coatings by electrochemical methods. □

Dr K. Balakrishnan

Dr K. Balakrishnan, Scientist EI and Head, Corrosion Science & Engineering Division, Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted as Scientist EII (w.e.f. 1 Feb. 1986)

Dr Balakrishnan (born 15 June 1935) has been working in the field of corrosion science and engineering for more than 27 years and has been consultant for various organizations in India on various aspects of corrosion control of industrial equipment and structures.

He is associated with a number of academic/professional bodies: Member, Corrosion Protection Committee of ISI; Fellow, Society for Advancement of Electrochemical Science and Technology, India; and Member, National Institute of Quality Assurance. He is an examiner for Ph.D. theses of the Gujarat, Bharathidasan and Madurai Kamaraj universities, and is a member of the Doctoral Committee of the Bharathidasan and Madurai Kamaraj universities. Also, he is secretary of the organizing committee of the 10th International Congress on Metallic Corrosion to be held in India.

He has 91 research papers to his credit, and has taken out 13 patents on corrosion inhibitors, sacrificial anodes, electrochemical protection, etc. He is recipient of the Mascot National Award for excellence in corrosion science and engineering (1985) of the Electrochemical Society of India.

Dr G. Prabhakara Rao

Dr G. Prabhakara Rao, Scientist EI and Head, Division of Interdisciplinary Electrochemistry, Central Electrochemical Research Institute, Karaikudi, has been promoted as Scientist EII (w.e.f. 1 Feb. 1986).

Dr. Rao, after obtaining his B.Sc. (Hons) and M.Sc. degrees in Chemistry, both in first class and with distinction, from the Andhra University, joined the Indian Institute of Science, Bangalore, for pursuing doctoral work. He was given the best Ph.D. thesis award and the Sudbrough Medal for his doctoral work by the institute in 1965. He visited USA during 1964-65 as a post-doctoral research associate at the University of Pennsylvania, Philadelphia.

Since 1966, he has been with CECRI working on problems of electrode kinetics and electroanalysis. His contributions to these areas include development of new transient and relaxation techniques

for the investigation of kinetics and mechanism of electrochemical reactions and evolving novel and simple electro-analytical techniques for trace analysis and their applications.

Being leader of the project team working on the development of ion sensitive electrodes he is responsible for commercializing the production of the electrodes based on solid membranes in the country, using the technical know-how developed at CECRI. This group is also actively engaged in R&D work on other types of membrane electrodes, viz. liquid membrane and gas sensor electrodes and their uses in environmental and biological applications.

He is recognised as a supervisor for doctoral research work by various universities in the country. He has published over 60 research papers in national/international journals and has a few patents to his credit.

Recently he has been appointed as national representative to serve the Commission on Electroanalytical Chemistry of the International Union of Pure and Applied Chemistry.

He visited France during September-November 1985 on a CSIR-CNRS Exchange Programme to acquaint himself with the current trend of researches in electrochemistry in that country.

Shri R. Subramanian

Shri R. Subramanian, Scientist EI, Central Electrochemical Research Institute, Karaikudi, has been promoted as Scientist EII (w.e.f. 1 Feb. 1986).

Shri Subramanian (born 20 November 1927), an M.A. (1958) in Chemistry of the University of Madras, joined CECRI in 1960. His research interests are in the areas of electroplating and metal-finishing. He was deputed under the Colombo Plan to UK in 1970 and he worked there on porosity in gold deposits. A recipient of the NRDC award for his work on electrogaining of aluminium for lithoplates, and solder and flux for joining aluminium cables, Shri Subramanian has to his credit about 60 research papers and eight patents. Three of his patents have been commercially exploited, one of them

being copper plating on stainless steel utensils. He is presently engaged in the fields of 'plating on plastics' and 'electroless plating.'

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At the Central Electrochemical Research Institute, Karaikudi, the following have been promoted as Scientists EI (with effect from the dates given in parentheses): Shri K. Dakshinamurthi (9 July 1985), Dr R. Gangadharan (21 Sept. 1985), Dr (Smt.) Kanakam Srinivasan (25 Jan. 1986) and Smt. Mary Juliana Chockalingam (28 Jan. 1986). Brief profiles of the promotees are given below:

Shri K. Dakshinamurthi

Shri Dakshinamurthi (born 19 Aug. 1939) did his M.Sc. (Chemistry) in 1963 from the Madras University. Prior to joining CECRI, in July 1964, he served for one year as a lecturer in chemistry in a private college in Madurai.

His research work spanning the past 22 years is in the field of batteries. He has been associated in the development of water activated batteries (magnesium-cuprous chloride and lead chloride systems) and lead acid batteries (SLI, electric vehicle and maintenance-free types). He was associated with the DST-sponsored project on the development of half-tonne pay load electric delivery van. 96V/300Ah prototype batteries were developed and tested on the electric vehicle. Test instruments for batteries and components such as Autobas for measurement of electrical resistance of battery separators and versatile test system for lead acid batteries were developed by him. He has also been engaged in organizing training programmes, seminars and techno-economic survey of battery industries. He is currently the head of the Battery Evaluation and Test Centre at the CECRI Madras Unit.

His current research interests include development of rechargeable alkaline manganese dioxide batteries, evolution of new test procedures and development of test instruments. He has to his credit

21 papers, four patents and six processes. He is a founder member of SAEST.

Dr R. Gangadharan

Dr R. Gangadharan (born 15 May 1938) has 22 years' experience in electrochemical research work. He received M.Sc. and Ph.D. degrees from the University of Kerala. His thesis for Ph.D. degree bears the title 'Kinetics of the electrode processes at solid state interphases'. He has wide research experience in fundamental, plating and electrometallurgy field. He is actively engaged in developing non-aqueous batteries, and studies pertaining to non-aqueous electrochemistry.

Dr (Smt.) R. Kanakam Srinivasan

Dr (Smt.) R. Kanakam Srinivasan holds M.A., M.Sc. and Ph.D. degrees. She joined CECRI, Karaikudi in November 1963 as Senior Laboratory Assistant. For the past 23 years, she has been working in the field of electroorganic chemistry. She has developed a number of processes for the preparation of organic compounds through electrolytic methods. She has published 17 papers and filed 7 patents. Some of the processes have been handed over to industry. She is a recipient of NRDC award for the process on 'succinic acid'. At present she is engaged in the studies related to reduction of carbonyl compounds.

Smt. Mary Juliana Chockalingam

Smt. Chockalingam (born 14 July 1940) joined CECRI in August 1962 as JRF and later as SSA in January 1964. She is working in the field of solid state science for the past 20 years. She has developed a number of photoconductive materials such as the sulphides and selenides of silver, mercury, copper, thallium and antimony by simple chemical method. She has developed photoconductive cadmium sulphide and cadmium selenide cells. The know-how for the CdS

photocell has already been released to the Electron India, Madras, and has won a national award in 1973. She has published over 22 research papers in the field and has filed 8 patents.

At present she is actively engaged in the development of sintered CdS-based solar cells and in the preparation and characterization of newer materials useful for photovoltaic systems.

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At the Central Salt & Marine Chemicals Research Institute, Bhavnagar, the following staff members have been promoted on assessment:

As Scientist E-II

Dr K.P. Govindan, Dr G.D. Bhat, Dr S.D. Gomkale

As Scientist E-I

Dr B.P. Choudhari, Shri S.L. Daga, Dr M.J. Mehta, Shri A. Tewari

As Scientist C

Dr J.K. Langalia, Dr O.P. Mairh, Dr R.A. Mahabala, Dr K. Rama Rao, Dr G.T. Desai, Dr H.N. Shah, Shri S.N. Shah

As Scientist B

Shri P.P. Joshi, Dr R.C. Modi

As Tech. Officer A

Km. T.N. Dave.

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At the Indian Institute of Chemical Biology (IICB), Calcutta, the following have been promoted on assessment (with effect from the dates given in parentheses):

Scientist EII [Gr IV (4)]

Dr B.K. Nath (1 Sep. 1985) and Dr I.N. Sengupta (1 Feb. 1986)

As Scientist EI [Gr IV (3)]

Dr (Km) Nilima Banerji (10 May 1984), Dr S.B. Mahato (26 Feb. 1985), and Dr M. Maiti (1 March 1985)

As Scientist C [Gr IV (2)]

Dr P.K. Bhattacharyya, Dr V.S. Giri, Dr N.P. Sahu, Dr A.K. Pal, Dr J.R. Vedasiromoni, Dr A.K. Sen, Dr S.K. Mitra, Dr (Km) Chhanda Mitra, Dr (Smt) Jharna Ghosal,

Dr (Smt) Minarani Mukherjee, Dr P.S. Basu and Dr K.A.I. Siddiqui (all the twelve from 1 Feb. 1986)

As Scientist B [Gr IV (1)]

Dr S.N. Chakraborty and Shri Nirmalendu Das (both from 1 Feb. 1986)

As Technical Officer [Gr III (3)]

Dr S. Bandyopadhyay (1 Feb. 1986).

Brief profiles of Dr B.K. Nath and Dr I.N. Sengupta are presented below:

Dr B.K. Nath

Dr Nath (born 1 March 1928) did his B.Sc. in 1948 and M.Sc. (in applied physics with instrument engineering as special subject) in 1950 from the University of Calcutta. He joined the Applied Physics Department as a teacher and later he was awarded D. Phil (Sc) in 1964 of the University of Calcutta for his studies on theoretical optics (assessment of optical system suffering from aberrations). Prior to joining CSIR in 1961 he served an instrument house as a senior service engineer for three years. Presently, Dr Nath is the Head of Instrument Section of IICB. He has visited UK, FRG, and Japan for training and research work in instrumentation and has developed instruments which have been commercialized successfully.

Dr Nath is a member of the Optical Society of India and the Institute of Instrumentation Scientists & Technologists. He has twelve publications to his credit.

Dr I.N. Sengupta

Dr Sengupta took his M. Sc. degree in applied mathematics from the University of Calcutta in 1955 and INSDOC's Association in information science in the year 1965. He holds two Ph. D. degrees in the field of Library and Information Science. The first Ph. D. (Sc.) degree was awarded to him by the University of Calcutta, as an independent research candidate (first Ph. D. of the Department of Library Science of the university). The second one was awarded to him by the Karnataka University, Dharwad.

Dr Sengupta joined the Central Board of Geophysics (now NGRI) on 14 January 1959 and was subsequently transferred to IICB in 1962. He joined NCL as Senior Documentation Officer Grade II in 1968. He also worked on deputation as Deputy Director (Documentation) in the Research Designs and Standards Organization, Ministry of Railways during 1973-1975. He was promoted as Scientist EI in 1981.

Dr Sengupta has made in-depth study of citation analysis and its application to various scientific disciplines. He has been engaged in bibliometric research for the last 20 years and has made some significant and original contributions in the field. He has identified core periodicals with great accuracy in different disciplines of biomedical sciences, viz. medical science, biochemistry, microbiology, physiology, pharmacology, genetics, neuroscience and biophysics. Statistical studies made by him showed that only a handful of core periodicals identified by him in these fields publish maximum segment of contemporary literature of the respective field. His research findings have helped in streamlining the acquisition policy of the institute's library without detrimenting the research interest of the institute and saving thereby a significant amount of foreign exchange towards journal subscription.

With the help of enormous data collected by him, he put forward an empirical law which he called the Sengupta's Law of Bibliometrics. He also gave an offsetting weightage model for proper evaluation of post-war periodicals. His three new bibliometric parameters have helped evaluate scientific journals according to scientific interest, compactness of information content and scientific value of published articles. He also developed an objective method for ranking scientific periodicals, which is capable of eliminating geographical and language bias and also other pit-falls of citation studies based on primary or secondary source journals for collecting citation data.

In recognition of his original contributions in bibliometrics, Dr Sengupta was

invited by the Department of Librarianship, Strathclyde University, UK, to work as an outside expert in the field of bibliometrics. He was also nominated the only member from the Asian countries to the first FID (International Federation of Documentation) Committee on Informetrics which was formed in 1980 and has its secretariat at Bielefeld, FRG, under the Chairmanship of Prof. O. Nacke. He has been nominated a member of the same committee for the second successive term. He is a permanent referee and a member of the international board of editors of *Scientometrics* from its inception.

Dr Sengupta has worked as a Guest Scientist of the Institut für Dokumentation, Information und Statistik, Heidelberg, on a collaborative bibliometric project to determine the impact factor of the cancer literature. While in FRG he was invited by the British Council and Bulgarian Academy of Sciences to visit their respective library systems and deliver talks on bibliometrics.

He was associated with the Department of Library and Information Science of the Nagpur, Banaras Hindu and Burdwan universities. He is an outside faculty member of the training course run by INSDOC and NML. Dr Sengupta is also associated with Indian Statistical Institute, Central Drug Research Institute, Asiatic Society and the Society for Information Science as a member of the technical expert committee for library, documentation and information.

Dr Sengupta is a life member of Indian Library Association, Indian Association of Special Libraries and Information Centres, Indian Medical Library Association, Society for Information Sciences, and Indian Techno-science Librarians and Information Scientists Association.

Dr Sengupta has more than 60 research papers mostly on bibliometrics to his credit and has compiled 55 comprehensive bibliographies on topics of interest in biomedical research.

Honours & Awards

Dr R.A. Mashelkar wins Dr K.G. Naik Gold Medal for 1985

Dr R.A. Mashelkar of the National Chemical Laboratory, Pune, has been awarded the K.G. Naik Gold Medal for the year 1985. This medal is given annually for research contributions in the field of chemistry with special reference to the impact of this research on industry.

Dr Mashelkar and coworkers have made significant contributions in the field of polymer science and engineering. *Jal-shakti*, a super absorbing polymer developed by the group has proved to have exceptional promise in the area of agriculture, forestry and wasteland development. IOCL (Khopoli) will set up a plant to manufacture 5000 tonnes/annum of this polymer. The speciality rubber, sulphochlorinated polyethylene, will be commercialized (2500 tonnes/annum) by Sriram Rayons (Kota). Besides these, the development of polyphenylene sulphide, a high performance engineering plastic (jointly with Sriram Fibres), and the development of drag reducers for oil transport are other notable achievements.

One of Dr Mashelkar's contributions has been in the area of computer modelling and simulation of polyester fibre plant. This was the first total simulation effort of its kind. The computer simulation has led to some unique software development which has been used imaginatively for productivity and product quality improvement in polyester fibre industry in India.

Dr Mashelkar is the winner of several honours and awards including S.S. Bhatnagar prize (1982), Herdillia award (1982), Santappa Silver Jubilee award (1983), UGC national lectureship in engineering and technology, Honorary Visiting Professorship at the University of Salford, Fellowships of the Indian National Science Academy and the Indian Academy of Sciences, etc. His fundamental research contributions span over 130 research

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publications and he has edited seven books. He is the editor of *Non-Newtonian Fluid Mechanics*, *Rheologica Acta*, and *Chemical Engineering Communications*.

Prof. R. Narasimha

Prof. R. Narasimha, Director, National Aeronautical Laboratory, Bangalore, has been nominated to the Science Advisory Council to the Prime Minister. The Council, which has a two-year tenure, will advise the Prime Minister on various aspects of science policy. Also, Prof. Narasimha has been conferred the California Institute of Technology Distinguished Alumni Award for the year 1986 for his contributions to aerospace engineering.

Shri M.N. Seetharaman

Shri M.N. Seetharaman, Officer in charge, Information Centre for Aeronautics, National Aeronautical Laboratory, Bangalore, has been named Coordinator of the newly constituted Aerospace Information Panel of the Aeronautics Research & Development Board.

Shri Seetharaman will also serve the advisory capacity on two other committees: the Public Technical Library Committee appointed by the Government of Karnataka and the Advisory Committee set up by the High Court of Karnataka.

Shri T. Narayana Rao

Shri T. Narayana Rao, Propulsion Division of the National Aeronautical Laboratory, Bangalore, has been awarded the Institute of Engineers Medal for his success in the Section B Electronics and Communication Engineering Examinations. Shri Rao, who secured the highest marks in the examinations, will receive his prize at the annual general meeting of the institute's Karnataka State Centre.

Shri S. Janardhan

Shri S. Janardhan, Scientist EI, Computer Centre, NAL, has become a Senior Member of the Computer Society of India.

Dr R. Krishna

Dr R. Krishna, Director, Indian Institute of Petroleum, Dehra Dun, has been awarded a UGC National Lecturership for 1986-87. Dr Krishna plans to avail this lecturership at the University of Bombay and the Indian Institute of Science, Bangalore.

Dr P.K. Ray

The Ministry of Petroleum and Natural Gas, Government of India, has formed a committee on Environmental Planning and Coordination for the ministry, for a period of two years with Dr P.K. Ray, Director, Industrial Toxicology Research Centre, Lucknow, as one of the members of this committee. The terms of reference of the committee will be to advise on all aspects of environmental planning for schemes and programmes of the ministry.

Dr S.K. Tandon

Dr S.K. Tandon, Scientist EI, Industrial Toxicology Research Centre, Lucknow, has been elected Fellow of the Royal Society of Chemistry (FRSC), London, with effect from 11 July 1986. Accordingly, he has been designated as Chartered Chemist (C.Chem.).

Dr R. Sarin

Dr R. Sarin, Head, Basic Research and Training Division of the National Environmental Engineering Research Institute (NEERI), Nagpur, has been awarded the 1987 Eisenhower Fellowship. Dr Sarin is the only Indian to receive this honour for the year 1987. □

SENIOR POSITIONS AVAILABLE

CSIR Advertisement No 12/86: Two Scientists 'F' for CRRI

It is proposed to appoint two Scientists F for Central Road Research Institute, New Delhi.

Job Requirements:

High level leadership in R&D work in (1) transport planning with particular reference to road transportation including environmental aspect, traffic management and traffic engineering measures, road safety, etc., and (2) broad area of flexible pavement and to undertake and guide consultancy assignments in the area.

Qualifications & Experience: High academic qualifications in engineering with first class master's degree or Ph.D. in the related fields. Should have an established reputation of excellence with at least 10 years R&D experience as evidenced by publications/patents in (1) Traffic transport engineering and (2) Flexible pavements for road and air fields, materials and mixes, design and evaluation; construction and maintenance.

Salary/Conditions of Service: The scale of pay attached to these posts is Rs. 2000-125/2-2500 plus allowances as admissible under Central Government Rules. This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed. Consultancy subject to an upper limit of Rs. 15,000 per annum is permissible. Free medical aid and leave travel concession are also permissible for the family as per government rules. Residential accommodation will be provided on payment of usual rent subject to availability.

Age: Preferably below 50 years, relaxable in deserving cases.

A duly constituted screening committee will decide on the number of scientists to be invited to meet the full selection committee. The decision of the Council in this behalf will be final. Applications from employees working in government departments/public sector organisations & government funded research agencies will be considered only if forwarded through proper channel and with a clear certificate that the applicant will be relieved within three months of receipt of the appointment orders.

Those interested may kindly send in their curriculum vitae in duplicate in the standard proforma obtainable from the Joint Secretary (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110 001, on or before 9 October, 1986. □

OBITUARY

Shri A.K. Gupta

Shri A.K. Gupta, Assistant Editor B, Publications & Information Directorate, New Delhi, expired on 27 August 1986. □

CSIR NEWS



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*Bench scale unit for producing
antioxidant additive, DSBPD,
at IIP, Debra Dun*

Zambian Prime Minister Mr. Musokotwane visits CLRI

The Prime Minister of Zambia, The Right Honourable Kebby Sililo Kambulu Musokotwane visited the Central Leather Research Institute, Madras, on 26 September 1986. He was accompanied by the Minister of Commerce in the Cabinet and higher officials.

Dr. G. Thyagarajan, Director, CLRI, received the Prime Minister and his entourage and showed them round the theme pavilion and the newly acquired computer-aided design system for footwear R&D. The theme pavilion portrays the development pattern of the Indian leather industry from a 90% exporter of raw hides and skins in the 50's to a 90% exporter of finished leather and products in the 80's because of the R&D, industry initiatives and Government policy support. This remarkable metamorphosis was appreciated by the Zambian Prime Minister who noted that so far as

leather is concerned Zambia is today where India was two decades ago and that the Indian experience would be useful to his country. New R&D initiatives of CLRI for the scientific and technological modernization of the leather industry were also explained.

Dr. Thyagarajan apprised the visiting Prime Minister of the role being played by CLRI in manpower education, development and training not only for India but also for other countries. Six Zambians spent a total of 27 months in CLRI specializing in leather and leather goods, in the marketing of hides, skins, and animal byproducts utilization.

A note prepared in advance by the CLRI outlining Zambian livestock resources, Indo-Zambian trade levels and potential, past and perspective CLRI—Zambia areas of cooperation was handed over to the Prime Minister. □



Zambian Prime Minister Mr. K.S.K. Musokotwane at CLRI. At his left is the Zambian Minister of Commerce and at his right Dr. G. Thyagarajan.

IIP enters into an agreement with Standard Mills Company for the production of DSBPD

The Indian Institute of Petroleum (IIP), Dehra Dun, entered into an agreement during August 1986 with the Standard Mills Company Limited, Bombay, for the development of a process for the production of NN'-di-sec-butyl-p-phenylenediamine (DSBPD), an effective specified antioxidant additive for gasoline, diesel oil and ATF. The agreement stipulates development of the process on laboratory scale, demonstration of the same for know-how transfer, collaboration in the pilot plant work and assistance towards early commercialization.

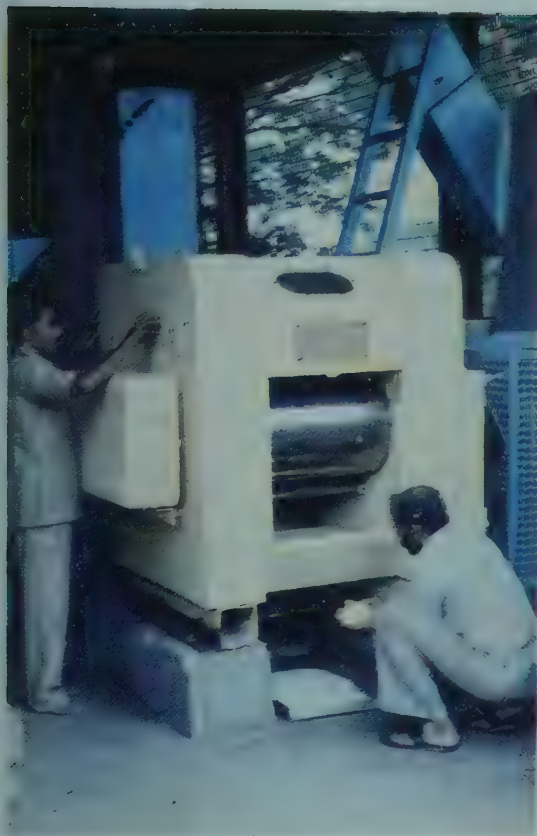
Development of the process on the laboratory scale is nearly complete; first demonstration runs have been satisfactorily conducted in the presence of the licensee.

This anti-oxidant is a high cost additive, currently being used by most of the refineries; the present requirement of about 200 tonnes/annum is being met by imports costing about Rs. 3 million per year. In the IIP process DSBPD is produced by the reductive alkylation of p-nitro-aniline. □

CFTRI process for making jowar flakes ready for commercialization

The Central Food Technological Research Institute (CFTRI), Mysore's process for making *jowar* (sorghum) flakes which can be used as a tasty deep fried product like *chewda* or in any food product made with rice flakes, is now ready for commercialization.

The process consists of cleaning, conditioning and polishing of the *jowar* grain, soaking, steaming and cooking. The cooked *jowar* is flaked in a roller flaker and then dried. Commercial varieties of *jowar*, especially the hard textured grain, are more suitable for making flakes. In this process, using indigenous



Jowar mill

equipment, 300 kg *jowar* can be processed in one hour.

The institute had arranged a demonstration of the process to the entrepreneurs last year and the response was encouraging. *Jowar* forms the staple food of a large section of the population in villages, particularly in dry tracts, and is mostly used in the form of *roti*, *bhakri* or *mudde*. CFTRI studies have shown that polished *jowar* can be used in puffed or popped form, for making noodles, or as a substitute for rice in *dosa* and pancakes. These studies have widened the horizon for *jowar* by making it possible to use it for diverse food products popular with consumers.

The know-how for making *jowar* flakes is available on payment of Rs 1000, from CFTRI. □

Fruit processing unit commissioned

The Agro Foods Punjab Limited has recently commissioned a modern fruit processing unit, capable of processing over 50 tonnes of oranges and 10 tonnes of tomatoes per day at Abohar in Punjab, with the technical assistance of CFTRI.

The institute provided the project report for establishing the unit, and assistance in selection of principal plant and equipment, standardization of production, and quality assurance. The major components of the plant have been obtained indigenously. □

Technology for building bricks from fly ash productionized

The technology developed by the Central Fuel Research Institute (CFRI), Dhanbad, for the production of building bricks from fly ash has been productionized through the National Research Development Corporation of India. The first unit based on the technology, with rated capacity of 30,000 bricks/day has recently gone into commercial production by NRDC licensee, Jagadhatri Bricks Industries Pvt. Ltd. at Talpukur, Barackpur. The project is expected to attain a capacity of 10,000 bricks/day shortly in its first phase of operation. The full capacity is likely to be achieved within the next few months time. All items of plant and machinery for the project have been designed and fabricated locally by a reputed machine manufacturer of Calcutta.

The quality of bricks available from the technology are much superior compared to the conventional red burnt clay bricks. The price of fly ash bricks is also comparatively cheaper than the conventional bricks.

Specifications	Fly ash bricks	Red burnt clay bricks
Size (m.m.)	250×125 ×75	250×125 ×75
Dry Density, (kg/m ³)	1570	1700
Cold crushing strength (kg/cm ²)	169	100
Water absorption (%)	12 to 13	20
Selling price (Rs 1000)	700	800

Also, with fly ash bricks one uses less amount of mortar; wall plastering on one side can be avoided and there is no seep-

age of water. The product is new to the market and will be significantly useful to the consumers.

NRDC has released this technology to a number of entrepreneurs in and around Calcutta. A few more units are, therefore expected to be set up in West Bengal shortly utilizing fly ash from thermal power stations at Bandal, Kola-ghat, Titagarh. □

Field distillation unit of improved design developed by CIMAP

Field distillation units are commonly used by small and medium producers of essential oils as these have the advantages of low capital cost and simple operation as compared to boiler operated units. A study of conventional field distillation units in use in India has revealed the following drawbacks in them: incomplete extraction and poor quality of essential oil, high fuel consumption, problems with effective sealing of tank lid, loss of oil due to inefficient condenser.

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, has designed and developed an improved field distillation unit completely eliminating the above drawbacks.

By incorporating economizer smoke tubes for effectively using all the heat from the furnace, it is possible to attain much higher steam generation level which ensures complete extraction of

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essential oils in considerably shorter batch time. Use of aluminium tubes for condenser and oil receiver eliminates fouling of essential oil by rust and corrosion and high quality oil is produced. Compared to conventional units, the improved unit is able to cut down fuel consumption by about 50% and time of distillation is reduced by 25%. Detailed designs of the field distillation units of capacity up to 700 kg raw material per batch are available from CIMAP. □

RRL-Jorhat develops pilot scale know-how for extracting diosgenin from dioscorea tubers

The Regional Research Laboratory, Jorhat, has developed the process know-how for extraction of diosgenin from dioscorea tubers. Diosgenin is one of the most versatile steroid drug precursors used at present for the manufacture of cortico steroids, female and male sex hormones, nylestrenol, 19-nor compounds, etc. It has an attractive market in India.

Diosgenin content varies in the tubers from less than 1 to 1.25%. A three-year old crop is the most suitable for achieving optimum yield. RRL-Jorhat has carried out extensive R&D work on its cultivation aspects also.

It has been found that a plant having 10 tonnes or higher capacity is economically viable. For a 10 tonnes/annum plant the total cost comes to about Rs. 60-70 lakh.

RRL-Jorhat has successfully completed the process development work for the extraction of diosgenin from the tubers. The process basically consists of acid hydrolysis and solvent extraction. In addition to the process being simple and short, both capital and operating costs are low because of lower batch times, better utilization of extraction facilities, reuse of acid and solvent, etc.

RRL-Jorhat can provide to interested parties the basic process design package within six months from the date of transfer of know-how. □

Synthesis and crystal growth of infrared detector materials

All objects, ranging from heavenly bodies to human beings, naturally emit infrared (IR) radiation. By detecting this radiation by an IR detector system, objects can be 'seen' even in complete darkness (IR or thermal imaging). Many of the modern space and defence applications, such as remote sensing and night vision, etc., are based on thermal imaging of objects at ambient temperature.

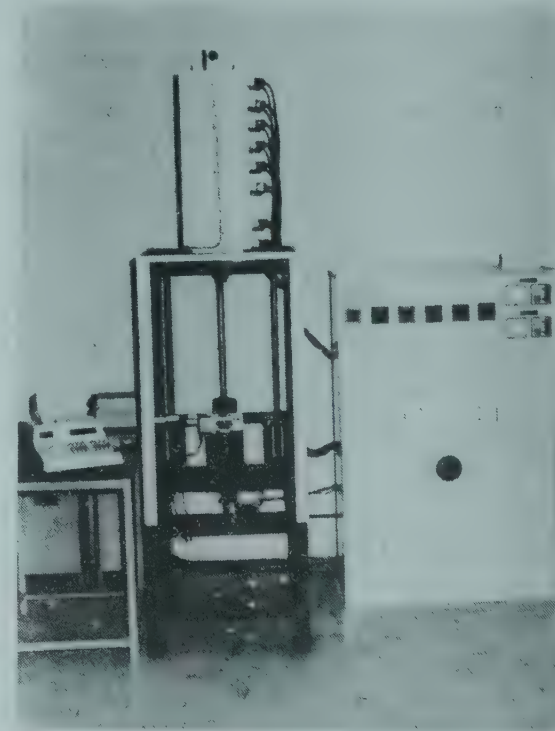
All objects at ambient temperature naturally radiate around a wavelength of $10\text{ }\mu\text{m}$. Intrinsic semiconductor materials with band gap of about 0.1 eV are best suited to detect this radiation. Mercury cadmium telluride (MCT) has, in recent years, emerged as the best among such materials. One of the interesting aspects of this material is that its band gap can be varied to suit a variety of applications by changing the molar fraction of cadmium (x) in $(\text{Hg}_{1-x}\text{Cd}_x)\text{Te}$. However, preparation of detector grade MCT crystals has been a difficult task for various reasons. The major problems in the crystal growth of MCT from the melt are the continuous variation in composition along the length caused by the large separation of the solidus and the liquidus lines in the pseudo binary phase diagram and the decomposition of this material at melting temperatures causing high internal pressures often leading to explosions.

These problems have been overcome by the Infrared Sensors Group of the Materials Science Division at the National Aeronautical Laboratory (NAL), Bangalore by making some important modifications in the vertical zone melting procedure to suit the crystal growth of this material. A complete crystal growth set-up has been designed and fabricated in the laboratory incorporating these modifications. It consists of a vertical multi-zone furnace which also provides a narrow zone for melting. It also has a mechanism by which the crystal growth ampoule can be rotated axially and moved through the furnace at the requ-

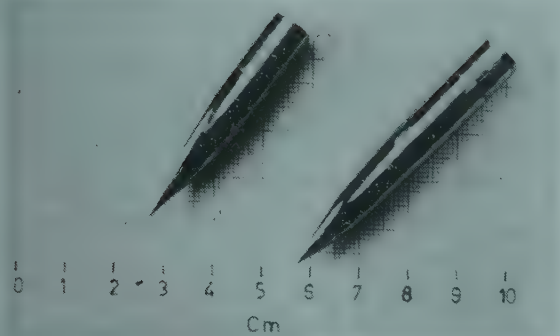
ired rate. A data logger monitors continuously the temperatures of various zones.

The crystals grown using the set-up have been characterized for their relevant properties such as homogeneity of composition, dislocation density, energy band gap, carrier concentration and mobility. The composition has been determined by lattice parameter measurements; the dislocation density by counting the number of etch pits and the band gap, carrier concentration and the mobility have been evaluated from measurements of resistivity and Hall coefficient as a function of temperature down to 10 K.

Some of the typical results: The axial variation of composition (x) vs band gap in a crystal shows that after an initial variation over 2 cm the composition becomes almost constant; the variation of x in $(\text{Hg}_{1-x}\text{Cd}_x)\text{Te}$ is ± 0.005 . Electron beam microprobe analysis indicates that the radial variation in composition is negligible in the central 0.6 cm core of the crystal. The dislocation density increases along the length of the crystal from the first to freeze tip and in the middle it is somewhat constant at a value of $7 \times 10^4/\text{sq cm}$. The carrier concentration also increases from the first to



Set-up established at NAL for growing crystals of mercury cadmium telluride



A few typical crystals grown at NAL, the crystals have a diameter of 1 cm and lengths ranging from 5 to 8 cm

freeze tip towards the end of the crystal and it is somewhat constant in the middle at about a value of $6 \times 10^{15}/\text{cm}^3$ at room temperature. The Hall mobilities are in the range of 10^4 to 10^5 sq cm/volt sec. The best crystal has a carrier concentration of $1.1 \times 10^{15}/\text{cm}^3$ and carrier mobility of 1.1×10^5 cm²/volt sec. at room temperature. □

CSA-NASTRAN Workshop at NAL

The National Software Centre for Aeronautical Structures (NASCAS) has recently acquired its second major general purpose package CSA-NASTRAN following the acquisition of ASKA in 1985.

The NASTRAN program is a finite element computer code intended for general use in structural analysis. The range of analysis types supported by the program are: Linear static analysis, Nonlinear static and buckling analysis, Normal mode analysis, Complex eigen value analysis, Magnetic field problems, Piezoelectrical material problems, Heat transfer analysis, Aerodynamic flutter analysis, Hydroelastic analysis, Dynamic response analysis, Acoustic cavity analysis and Direct Matrix abstraction. CSA-NASTRAN is an enhanced derivative of the April 1984 release of the NASA version of NASTRAN. It contains several new features as well as enhancements to current capabilities available in the NASTRAN program. The

enhancements generally pertain to the user convenience features and computational efficiencies of the program. Among these enhancements are automatic constraint of singularities on user option (PARAM, AUTOSPC), simplified user interface to matrix data (INPUT4/OUTPUT4 modules), default values for executive deck TIME and APPROACH cards, extended bulk data deck echo options, selective processing of case control directives (SKIPON, SKIPOFF), rigid format alter packets sorted on input, additional formats for rigid elements and a reduction in the amount of time required for the Fast Eigenvalue Extraction Routine (FEER) method of real eigenvalue analysis. The new features available in CSA/NASTRAN provide users with additional options for finite element selection and methods of analysis. These new features include layered composite element construction analysis capability, new combined membrane/plate isoparametric elements capable of representing membrane/bending coupling behaviour, enhancement to full stressed design analysis options and a first level capability to perform composite structure optimisation.

A short term course-cum-workshop on the usage on CSA-NASTRAN program, originally developed by NASA experts, was organized by the Structures Division of National Aeronautical Laboratory (NAL), Bangalore, in April 1986 under the sponsorship of the ARDB.

The course was inaugurated on 1 April 1986 by Prof. R. Narasimha, Director, NAL, and was conducted by Dr R. Narayanswamy, President, CSAR, USA. A total of 50 participants, including 30 from external organizations like HAL, DRDO, IISc and BHEL attended the course.

The course programme consisted of lectures on static and dynamic solution capabilities on CSA-NASTRAN followed by rigorous workshop sessions at the NAL Computer Centre. An important feature of the course was the consideration it accorded to the theoretical aspects of CSA-NASTRAN. The course concluded on 11 April 1986.

The participants, in their reports, complimented NAL on all aspects of the course and indicated that the package was likely to prove very useful in their applications. NAL, on its part, extended the facilities at the Computer Centre up to 30 April 1986 to all external participants. □

Chemical nature of clays and their role in coagulation

Shri V.P. Thergaonkar of the National Environmental Engineering Research Institute, Nagpur, examined the relationship between coagulant doses and the chemical nature, especially cation exchange capacity, of clays and studied coagulation of the clays in the presence of coliform bacterial cell.

It was observed that optimum alum doses were required to get residual turbidity of 50 NTU increased with the cation exchange capacity of soil, irrespective of pH. Soil suspensions of higher CEC flocculated better at lower pH.

Jar tests were carried out for coagulation of these soils in the presence of bacterial cells. Bacterial cells may release organic impurities and they might complex with clays. The extent of the adsorption depends on pH.

For the study of coagulation of soil/clay, two types of suspensions were prepared, one with predominance of bacterial cells and the other with predominance of clays, at various pH.

Synthetic clays montmorillonite, bentonite and kaolinite which were the predominant clay types in the soils studied earlier were coagulated at different pH varying from 3 to 10 and in presence of different concentrations of bacterial cells. Coagulation curves drawn indicated differential soil bacteria sorption and the resulting suspension governed the dose.

The coagulation of fly ash with and without bacterial suspension of kaolinite and/or soils having CEC 17 meg/100 g was found ineffective in the pH range 3-5. The soils of CEC 8, 17 and 81

meg/100 gm flocculated at pH 7 in presence of bacteria. Pure clays showed poor response to flocculation in presence of bacteria. Coagulation tendency of kaolinite suspension was identical to that of soil with CEC 17 meg/100 gm. Kaolinite and montmorillonite could be flocculated at pH 11, but in presence of bacteria only montmorillonite could be flocculated.

Shri Thergaonkar was awarded Ph.D. degree by the University of Nagpur for his thesis based on these studies. He worked under the guidance of Dr O.B. Thakre. □

Catalytic reactions over ZSM-5 type zeolites

The superior catalytic activity of ZSM-5 type zeolites for organic reactions arises from their special structural features, greater thermal and hydrothermal stability and availability of protonic sites whose number and strength are influenced by modification.

Shri I. Balakrishnan of the National Chemical Laboratory (NCL), Pune, carried out the preparation of ZSM-5 zeolites with different Si/Al ratios, ferrisilicates, boro- and lanthanum silicates with ZSM-5 structure, their modification, physicochemical characterization and evaluation for certain catalytic reactions, namely conversion of methanol to C_5^+ hydrocarbons (gasoline fraction) or C_2 - C_4 olefins, alkylation of toluene with methanol, disproportionation to toluene and isomerization of xylene and correlation of catalytic activity data with acidic and sorption properties.

The maximum yield of gasoline fraction is obtained in the temperature range 350-400°C. The BTX fraction increasing with temperature and the yield of BTX per mole of CH_2 being roughly the same irrespective of the reactants (methanol, ethanol, diethylether or ethylene) used, suggesting a common reaction scheme involving light olefin intermediates. By tetrahedral substitution of Al^{3+} with other trivalent ions and reduction in strong

acid sites by chemical modification, C_2 - C_4 olefin yield in the methanol conversion can be increased.

p-Xylene selectivity has been related to sorption ratio of para to orthoxylene, illustrating the contribution of diffusion controlled product selectivity effects to shape selective catalysis which enhances para selectivity in reactions.

Shri Balakrishnan carried out these studies under the guidance of Dr (Km.) S.B. Kulkarni of the laboratory and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

Dr A.P. Mitra visits NRDC

Dr A.P. Mitra, Director General, CSIR, and Secretary, Department of Scientific & Industrial Research (DSIR), visited the National Research Development Corporation on 24 July 1986. He was accompanied by Shri Ashok Parthasarathy, Additional Secretary, DSIR.

Shri N.K. Sharma, Managing Director of NRDC, apprised the distinguished vis-

itors with the various achievements of the Corporation over the past decade. A video program on the activities of the Corporation was presented and Dr Mitra was taken round the exhibits depicting the functions and achievements of the Corporation.

Dr Mitra was presented a set of publications/documents brought out by the Corporation and also a video cassette on 'NRDC—A force in technology transfer'. □

Members of the CSIR Review Committee visit NML

The members of the CSIR Review Committee, constituted by the President, CSIR, visited National Metallurgical Laboratory, Jamshedpur, on 5 August 1986. Dr. A.P. Mitra, Director General, CSIR, accompanied the review committee.

The members went round the laboratory and held discussions with the senior scientists of the laboratory in the morning followed by discussions with the younger scientists in the afternoon.

The Committee discussed on various aspects like project selection, transfer of technology, phase gaps in technologies,



Dr A.P. Mitra, DG, CSIR and Secretary, DSIR, with Shri N.K. Sharma, Managing Director, NRDC



Prof. Abid Hussain, Member, Planning Commission and Chairman of the CSIR Review Committee, addressing the NML scientists; others seated from left are: Dr. T.K. Roy, Dr. A.P. Mitra and Prof. S. Banerjee.

interaction with industries and universities, etc. The NML Director, Prof. S. Banerjee described the achievements of the laboratory and the various problems facing the institute, and the measures taken to overcome the same. □

APINMAP Secretary General visits PID

Dr. Kamchom Manunapichu, Interim Secretary General, APINMAP and Professor of Chemistry, Mahidol University, Bangkok and Mr. Lim Huck Tee, Chief Librarian, University Sains Malaysia, Penang, visited the Publications & Information Directorate (PID), New Delhi, on 22 September 1986 on a consultative mission to have a firsthand knowledge of the facilities available at PID to develop APINMAP programme with PID as a regional national node.

After a brief discussion with the Editor-in-Chief of PID, the team visited the Research and Specimen Cell, the Wealth of India and Technical Information Services divisions. The team was apprised of

the work done at PID in regard to MAPIS and the steps involved in the production of the journal, *Medicinal and Aromatic Plants Abstracts*. They complimented PID for bringing out this prestigious journal, covering world literature on medicinal and aromatic plants for the benefit of researchers and industrial entrepreneurs.

Dr. Manunapichu explained the scheme of APINMAP for exchange of information in this field and setting up a network with three regional nodes one each at India (PID), Hongkong (The Chinese Medicinal Materials Research Centre) and Philippines (The Agricultural Information Bank for Asia) with national nodes in their respective regions. The compatible computerized format of the work sheets will be designed by Shri Tee to facilitate the exchange of data from one node to another node within the network. In this respect the MAPA database already created by PID will be made use of as such, since it includes world literature covering about 650 journals from 55 countries in 22 different lan-



UNESCO Consultants Dr. Kamchorn Manunapichu (2nd from right) and Mr. Lim Huck Tee (extreme left) with senior scientific staff of PID during their visit to discuss the issues connected with APINMAP set-up.

guages. The Secretary General requested the Editor-in-Chief to consider a proposal to train the information personnel from the participating countries of this network in indexing and abstracting services to strengthen the network programme. PID has also been requested to supply the consolidated list of storage and retrieval terms (thesaurus) suiting to the international standards to maintain uniform code of practice amongst the countries participating in this network. □

PROGRESS REPORTS

CRRRI Annual Report: 1985-86

The R&D activities of the Central Road Research Institute (CRRRI), New Delhi, during 1985-86, according to its annual report for that period, continued to be in the areas of geotechnical engineering, soil stabilization and rural roads, flexible pavements, rigid pavements, roads, bridges, instrumentation, and traffic subdisciplines. The institute handled 12 sponsored research projects and 73 consultancy schemes.

A traffic simulation modelling study for inter-urban road sections, carrying heterogeneous traffic, was completed in cooperation with the Swedish Road and Traffic Research Institute and the Indian Institute of Technology, Kanpur.

A continuing project on short-range study on the possibility of bringing in accountability of maintenance work, based on riding quality measurements made considerable headway. The project was assigned by the Ministry of Transport. Another project, also sponsored by Ministry of Transport, on the development of comprehensive data on the level of surface finish for different pavement layers also registered notable headway, leading to a report on the analyses of data collected thus far. The pavement performance study, the most comprehensive pavement research project undertaken so far in the country and sponsored by the Ministry of Transport, also re-

ceived considerable fillip during the year. The project scope was reviewed and recast into two components: one each for in-service sections and new special sections. The plans were finalised in consultation with the World Bank experts, equipment and instrumentation required were identified, and steps initiated for locating possible sites towards final selection.

In cooperation with the Border Roads Organisation, a trial section was constructed with the use of ribbed pre-cast concrete block pavement in western Rajasthan. Bulk of the work of field measurements was completed, and punching and taping of the data was undertaken on the geometric and surface characteristics of the National Highway network in the country. In the area of traffic and transportation, the institute carried out limited surveys in 14 selected cities, on immediate basis at the instance of the Ministry of Transport, as a national requirement. The traffic and transportation studies were undertaken in five districts of Karnataka for the planning of passenger transport system on behalf of the Rail India Technical and Economic Services, for the Karnataka State Road Transport Corporation. Mobility levels and transportation problems of various population groups were studied for modal split forecasting and for planning transportation strategies. This study is sponsored by the Planning Commission. There has been a notable activity at the national level in regard to transportation planning and transportation technologies. The institute made its own inputs for such interactions in the Planning Commission as well as the Ministry of Transport. Additional work was completed for the planning of road system for Bombay Metropolitan Region. On behalf of the Government of Haryana, the institute carried out a study on the possible development of a trunk route across Haryana, as an alternative to National Highway 1.

In the area of soil stabilization and rural roads, additional analyses were carried out on the socio-economic impact

of road development in rural areas. Work was initiated on a system of intermediate technologies, and trials were carried out on a village road near Delhi. In continuation of the work done earlier, a study was carried out in Haryana on the damage caused to roads by solid-wheeled animal drawn carts. Work was continued on the mechanism of lime-soil stabilization and the related durability aspects. In the field of flexible pavements, design curves were developed, correlating CBR value with pavement thickness, for a 650-tonne heavy lift crane for an atomic power project. Similarly, evaluation studies were carried out on behalf of the Indian Oil Corporation on road bitumen from an indigenous crude containing low asphaltene. Also at the instance of the Indian Oil Corporation, work was taken up on the preparation of a handbook on bituminous road construction.

Investigations were completed on the studies sponsored by IRC and ISI on the use of ordinary portland cement and portland puzzolana cement in reinforced cement concrete works. Consultancy and testing services were provided to a number of agencies and a new project was taken up on rolled cement concrete for pavements.

In the area of geo-technical engineering, a falling cone apparatus was developed for the measurement of resistance to puncture in geotextiles. In the field of instrumentation, electronic circuit board and arc board used in gradometer were developed. A piezoelectric load cell was also developed. On behalf of the Ministry of Transport and Maharashtra PWD, investigations were carried out on the suitability of certain soils for use in road fills. Alternative fill materials were identified and characterized. Investigations were carried out on the causes and remedial measures for a slope failure in the compound of a naval building in Andamans. Advice and assistance were provided to Uttar Pradesh PWD on causes and corrective measures for landslides in Nainital area. A number of investigations were carried out in the area of bridge engineering. Steel truss bridges were rated in the

north eastern sector for their structural capacity with regard to the passage of special vehicles of the Oil and Natural Gas Commission.

At the request of the Chief Engineer, Hill Zone, U.P., P.W.D. Nainital, investigations were made regarding the landslides in Nainital Area. Field geological and geotechnical investigations were carried out at the following four locations on the Bareilly-Almora Highway: Landslide at Dolmar (km 109), landslide at Nalena (km 118), landslide at Gathia (km 126) and landslide at Ratighat (km 150). The primary causes of instability at each of the sites were identified and suitable remedial measures were evolved for each of these sites. Geological studies have shown that the landslides near Dolmar and Nalena are situated within the Shivalik group of rock formations. Slates of Bhimtal formation are the predominant rock type in the Gathia landslide area. The landslide at Ratighat is situated near the contact zone of Bhowali and Bhimtal formations and as such this zone had experienced intense tectonic activity in the past.

The problem concerning the stability of a section of retaining wall situated on sloping ground at Port Blair was reported earlier. At the request of the Chief Engineer (Projects), Port Blair, Andamans, the stability of four other sections of the retaining wall situated on contiguous sloping ground were investigated. The alternative low-cost materials such as local soil and soft aggregates were suggested for paving village streets which are left unattended due to limitation of funds. A length of about 150 meter of village street was constructed in Nithari village of Noida. The performance of the experimental length is satisfactory.

The institute continued with its year-round activities of refresher/training courses in the fields of highway and bridge engineering, traffic engineering and transportation planning, quality control procedures and techniques, material testing, and elastomeric bearings. It organized a seminar on Roads and Road Transport in Rural Areas. This was co-

sponsored by 16 agencies of the centre and state governments. The three training workshops on rural road technologies, organized by the institute on behalf of the Department of Rural Development, were attended by 50 officers from States, engaged in the National Rural Employment Programme and the Rural Landless Employment Guarantee Programme. □

NEW PUBLICATIONS

Status of Research on Environmental Pollution in Mines and Mining Areas & Miners' Health

The Central Mining Research Station (CMRS), Dhanbad, has brought out the title report giving a brief account of some of the activities of the laboratory in the field of environmental health hazards in mines as well as mining areas. The activities of the environmental pollution and health discipline have been classified under: (i) air pollution, (ii) water pollution, (iii) noise pollution, (iv) physiology and ergonomics, (v) occupational diseases, (vi) corrosion in mine environment and (vii) design and development of personnel safety as well as other equipment.

Besides the above areas, the laboratory is also carrying out a great deal of work on underground mining such as mine ventilation, mine gases, mine fires, mine lighting and other safety aspects.

Enquiries pertaining to the publication may be addressed to the Director, CMRS, Dhanbad 826001.

Biotechnology and Utilization of Algae — The Indian Experience

The title publication is a consolidation of data collected at the Central Food Technological Research Institute (CFTRI), Mysore, both under Indo-German collaboration (1974-86) and DST-financed All India Coordinated Project on Algae. The recent status on utilization of algae as an unconventional protein source for feed and food uses has been clearly brought

out in the light of Indian studies and the international information available in published literature.

The publication covers following aspects pertaining to algae: cultivation, processing, yield, chemical composition, nutritional studies, quality standards and acceptability studies, animal feed, contamination, toxicological studies, biogenic and non-biogenic toxins and production costs. It also covers: algal system in effluent treatment, algae for varied end uses and algal biofertilizer.

The book (authors: L.V. Venkataraman of CFTRI and E.W. Becker, Institute für Chemische Pflanzenphysiologie, Universität Tübingen, FRG; pp. 257; tables 94; figures 87, and references 462) has been published by the Department of Science and Technology, and CFTRI. Copies of the publication (paper back Rs 100/\$15, hard bound, Rs 150/\$20) can be had from: The Head, FOSTIS, CFTRI, Mysore 570 013.

NEERI's Contribution to State of Uttar Pradesh

The Kanpur Zonal Laboratory of the National Environmental Engineering Research Institute, Nagpur, set up in 1962, has evaluated the performance of water treatment plants in Uttar Pradesh and has significantly contributed to the characterization and treatment of industrial wastes and byproduct recovery based on laboratory and pilot plant scale studies. It has demonstrated its capability during river pollution surveys conducted on the Ganga, Gomti and Pandu rivers. The expertise of this laboratory is also being utilized for monitoring of air in Kanpur city. The zonal laboratory will be the focal laboratory to participate in the national mission project on 'Prevention of Pollution and Cleaning of River Ganga.'

A review of the services rendered by the NEERI Zonal Laboratory is presented in this report (also brought out in Hindi). It covers pollution monitoring and control aspects relating to water, wastewater, air and solid wastes. The report indicates that this laboratory is adequately equipped

with trained men and material to assist various agencies in combating pollution.

Enquiries pertaining to the publication may be addressed to the Director, NEERI, Nagpur 440020. □

CONFERENCE BRIEFS

International Symposium on Rarefied Gas Dynamics

Prof. R. Narasimha, Director, National Aeronautical Laboratory, Bangalore, attended the 15th International Symposium on Rarefied Gas Dynamics, at Grado, Italy, during 16-20 June 1986, and delivered a lecture titled 'The infinitely strong shock'.

Sixth International Congress on Parasitology

Dr. S.R. Das of the Central Drug Research Institute (CDRI), Lucknow, attended the Sixth International Congress of Parasitology, organized by the Australian Society for Parasitology under the auspices of the World Federation of Parasitologists, at the Queensland University, Brisbane, Australia, during 24-30 August 1986. The congress was attended by about 1300 delegates from 70 countries.

The congress was divided into six streams: Molecules, cells and parasites; Parasites and human health; Parasite assemblage; Parasitism in aquatic environment; Productivity and animal health—Helminths; and Productivity and animal health—Arthropods and Protozoa.

The plenary sessions discussed the futuristic scenario of parasitology which was of particular importance to the congress deliberations. The workshops included poster presentations and lectures.

Dr. Das presented a paper on 'Phylogeny of amoebae placed in the order amoebida, Kent 1880'. He laid emphasis on the classification of amoebae based on the pattern of nuclear division rather than based on form, locomotion, pseudopodial character, flagella production, parasitic or free-living nature of amoebae. He referred to three distinct types

of nuclear division in amoebae. Promitotic type of nuclear division indicates primitive amoebae as they are nearer to amoeboid flagellates. Mesomitotic type of nuclear division is found in highly evolved amoebae, like in higher animals and plants. The most advanced type of nuclear division in the family *Hartmannellidae* suggests that amoebae have evolved from flagellate ancestors and not the flagellates from amoebae.

Health and Environmental Effects of Ozone Layer Modifications

Convincing evidence by recent studies has demonstrated that human activities are influencing the make up of the earth's atmosphere. If such changes continue, the ozone column in the atmosphere would get substantially modified. The ozone layer protects life on earth from the damaging ultraviolet radiation. If depletion of ozone occurs, the resulting higher levels of radiation lead to increased incidence of skin cancer and cataracts, suppress the human immune system, alter agriculture production, increase smog formation and accelerate weathering of plastics and even modify the aquatic food chain. A climatic change through 'Greenhouse effect' results in rainfall, water resources, and rise in sea level.

Such aspects of great concern and their possible impacts were examined at an international conference on Health and Environmental Effects of Ozone Modification and Climate Change organized by UNEP and the US Environment Protection Agency (USEPA) at Washington D.C., USA, during 16-20 June 1986. Dr. M.G. Anantha Padmanabha of the National Institute of Oceanography, Goa, attended the conference and presented a paper on 'Climatic change and coastal processes along Indian Subcontinent'.

Professionals concerned with strategic issues in environment, climate change, public health, forestry, agriculture and air pollution, coastal planners, scientists

from research laboratories, industry, government, NASA and NOAA, and legislators attended.

Papers were presented on the effects of ultraviolet radiation on skin cancers, the immune system, plastics and other polymers crops, acid rain and smog besides papers on potential impact of global warming of climate, sea level rise, water resources, agriculture, forests, health, air pollution and biological diversity. Legislators and senators of the US Congress gave keynote addresses on the question of how to use this assessment of risk in decision making. □

TRAINING COURSES

Refresher Course in Highway and Bridge Engineering

A three-month Refresher Course in Highway & Bridge Engineering was recently concluded at the Central Road Research Institute, New Delhi. This was attended by 15 trainees from various highway engineering organizations all over the country.

Twenty five personnel from the Delhi Traffic Police Department were trained in Traffic Volume Surveys from 8 to 15 July 1986.

Maintenance of Automatic Road Unevenness Recorder

A short-term training course on the use and maintenance of automatic road unevenness recorder/roughometer/bump integrator and introduction to other related devices was held at the institute during 4-8 August 1986, in which 40 participants from various highway engineering organizations all over the country participated.

Environmental Management

The National Environmental Engineering Research Institute (NEERI), Nagpur, organized a five-day training course on Environmental Management, starting from 21 September 1986. The topics covered included: Industrial zoning, Town

planning, Land use patterns, Low cost technologies and sanitation, Air pollution, Water pollution and supply, Solid waste disposal, Energy recovery and Environmental analysis. Twenty-five executives of the Uttar Pradesh Government participated in the course. □

Dr. M. Ramaiah

Dr. M. Ramaiah, Director, Structural Engineering Research Centre (SERC), Madras, has been appointed Chairman, Coordination Council for Engineering Sciences Group for a period of two years with effect from 15 September 1986. Consequently, Dr. Ramaiah will be a member of the Governing Body and the Society of Council of Scientific & Industrial Research for the said period. □

PERSONNEL NEWS

Appointments/Promotions

At the Publications & Information Directorate (PID), New Delhi, the following have been promoted, on assessment, with effect from the dates given in parentheses:

As Editor C [Group IV (2)]

Shri S. Hotchandani (10 Oct. 1984), Dr. Gian Singh (14 Nov. 1984), Dr. (Smt.) R.D. Kak (11 April 1985), Shri S. Hiranaiyah (9 Nov. 1985), Shri H.K. Khanna (30 Nov. 1985), Shri M.M.S. Karki (14 Dec. 1985), Shri A.K. Gupta (6 Jan. 1986) (expired on 27 Aug. 1986), Shri Tarun Banerjee, Shri R. Doreswamy, Shri J.B. Dhawan, Dr. B.C. Kashyap, Dr. N.R. Manakad, Shri A.K. Mandal, Shri P.S. Rawat, Dr. B.S. Aggarwal, Dr. Chander Shekhar and Shri Dilip Salwi (all the ten from 1 Feb. 1986).

As Asstt. Editor B [Group IV (1)]

Smt. Sivakamasundari (3 March 1982), Smt. Madhu Sahni (1 Feb. 1984), Shri V.V. Agadi and Dr. Rajiv Gupta (both from 1 March 1984), Km. Pramod Goyal (1 April 1984) and Dr. P.K. Panda (1 Sept. 1984).

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At the National Chemical Laboratory, Pune, the following have been promoted

on assessment (with effect from the dates given in parentheses):

As Scientist EII

Dr. P.H. Brahme (1 June 1985), Dr. C.I. Jose, Dr. B.B. Ghatge (both 1 Sep. 1985), Dr. V.M. Nadkarni (8 Jan. 1986), Dr. G.H. Kulkarni, Dr. R.N. Sharma, Dr. V.R. Choudhary, Dr. V.S. Patwardhan, Shri R.S. Singh (all the five from 1 Feb. 1986), Shri M.V. Gokhale (18 Feb. 1986) and Shri V.K. Selot (9 March 1986).

As Scientist EI

Dr. J. Kuruvilla (4 June 1985), Dr. R. Tewari (4 July 1985), Shri S.R. Modak (22 Aug. 1985), Dr. A.N. Gokarn (20 Sep. 1985), Dr. O.G.B. Nambiar (3 Oct. 1985), Dr. (Ms) Z. Muljani (21 Oct. 1985), Shri S.D. Bakare (18 Feb. 1986), Dr. J.C. Sehra, Dr. P.P. Pai, Dr. P. Umapathy, Dr. M.S. Setty (all the four from 6 March 1986) and Shri M.G. Sane (14 March 1986).

As Scientist C

Dr. K.S. Balaraman (30 July 1984), Shri R.R. Hendre (3 April 1985), Shri P.P. Lohokare (19 June 1985), Dr. A.R. Mehendale (23 Sep. 1985), Shri K.R. Bhinge (1 Nov. 1985), Dr. S.N. Kshirsagar (1 Dec. 1985), Dr. (Ms) M.V. Rele (21 Jan. 1986), Dr. A.S. Vaidya, Dr. V.B. Patil, Dr. C.S. Dorai, Dr. V.J. Rao, Shri K.G. Deshpande, Dr. S.T. Krshirsagar, Shri K.C. Brahme, Dr. P.P. Moghe, Dr. R.B. Malvankar, Dr. C.E. Deshpande, Dr. I. Balakrishnan, Shri H.S. Jagtap, Dr. S.D. Sathaye, Shri R.S. Karnik, Dr. M.P. Kulkarni, Dr. S.S. Ramdasi, Dr. S.K. Kamat, Dr. Harish Narain, Dr. V.S. Gunjekar, Shri I.C. Gouroji, Shri B. Seetaramarao, Dr. M.G. Parande, Shri M.G. Kotasthane, Dr. T.P. Mohandas, Dr. A.A. Natu, Dr. (Ms) V.B. Deodar, Dr. A.B. Sahasrabudhe, Shri S.S. Tamhankar, Shri I.I. Sutar, Shri A.A. Gunari, Dr. A.B. Landge, Shri V.R. Kulkarni, Ms M.S. Nalgaonkar, Dr. (Ms) N.R. Pavaskar, Shri N. Amarnath, Dr. S.D. Pradhan, Dr. B.R.K. Murthy, Dr. S.G. Pataskar, Dr. S.G. Hegde, Shri Nandkishore, Dr. B.M. Shinde, Dr. S.D. Sansare, Dr. V.K. Jayaraman, Dr. A.B. Mandale, Shri S. Gopichand, Dr. A.G. Kelkar, Shri D.D. Ravetkar, Dr. R. Nanda, Dr. A.N. Kotasthane, Dr. M. Narayana Rao, Dr. (Ms) R.S. Nadgauda,

Dr. A.H. Lachke, (all the fifty two from 1 Feb. 1986), Dr. M.S. Soni (16 Feb. 1986).

As Scientist B

Shri S.B. Deshpande (1 June 1984).

Shri Sanjay Nene, has been appointed Scientist C in the Chemical Engineering Division of NCL, Pune, with effect from 21 July 1986. Shri S.R. Srinivasan of NCL, Pune, has been promoted as Private Secretary with effect from 18 August 1986.

Honours & Awards

Dr. Akhtar Husain and Dr. B.R. Tyagi get VASVIK award

Dr. Akhtar Husain, Director, Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow, and Dr. B.R. Tyagi, Scientist E, Genetics and Plant Breeding Discipline, CIMAP, have been awarded the prestigious 'VASVIK Award'. The award has been given for their outstanding contributions in the development of essential oil plants with special reference to mints. The award, instituted by the Vividhlaxi Audyogik Samshodhan Vikas Kendra (VASVIK), Bombay, carries a cash prize of Rs. 25,000, a gold medal and a citation for each.

Dr. (Smt.) Chitra Dutta

Dr. (Smt.) Chitra Dutta, a Research Associate in the Indian Institute of Chemical Biology, Calcutta, has been awarded the third prize at the 4th Colloquium for Young Physicists organized by the Indian Physical Society, for her paper 'Near-equilibrium instabilities in closed chemical systems' on 20 August 1986 at the Saha Institute of Nuclear Physics, Calcutta.

Retirements

Dr. M.G. Anantha Padmanabha Setty

Dr. M.G. Anantha Padmanabha Setty, Scientist EII, National Institute of Oceanography (NIO), Goa, retired on superannuation on 30 September 1986.

Dr. Setty (born 30 Sep. 1926) had his education in Bangalore from where he obtained his B.Sc. (Hons.) and M.Sc. degrees. Later, he studied at the University of Utah (USA), from where he

obtained the Ph.D. degree in Marine Geology.

After serving as a teacher in his alma mater, he joined the then International Indian Ocean Expedition Directorate (now NIO) in 1964 at Cochin. Later in 1968, he was transferred to Goa to start the research centre of the institute. Till 1973, he was the Head of the Geological Oceanography Division of the institute at Goa.



Dr. Setty has to his credit more than 80 research papers in reputed Indian and foreign journals on various aspects of marine geology including his own specialization on marine micropaleontology in which he has contributed half a dozen papers on Antarctica samples alone.

He has widely travelled and has attended several national and international conferences. He is a recognized guide for Ph.D. of many universities. A former Rotarian, Dr. Setty is a Fellow of the Geological Society of India, Member of Sigma XI of USA and other societies.

Shri H. Bose

Shri H. Bose, Library Officer C, Publications & Information Directorate, New Delhi, retired on superannuation on 31 August 1986. □

ANNOUNCEMENTS

SERC TRAINING COURSES

The Structural Engineering Research Centre (SERC), Madras, will be organizing training courses on the following topics: (1) Dynamics of Civil Engineering Structures (19-23 Jan. 1987), (2)

Mass-Produced Precast Concrete Components (27-30 Jan. 1987), and (3) Application of Experimental Mechanics Techniques to Industrial Problems (2-6 Feb. 1987).

Dynamics of Civil Engineering Structures

The course is open to graduate civil engineers from public or private sector organizations, having some experience in the analysis and design of civil engineering structures and interest in the theory and applications of structural dynamics. The course will cover the following topics: Basic vibration theory covered to the extent needed for design engineers; Analysis and design of (i) block type foundations for impact causing machinery like hammers and steady state machinery including reciprocating and rotating type machines, and (ii) framed type foundations for supporting high speed machines like turbo-generator sets; Aseismic design of buildings; and Vibration isolation.

A general exposure will be given to the dynamic problems involved in the areas of offshore structures, wind induced oscillations of tall towers, and blast resistant design of structures. Workshop sessions for demonstrating the use of computer software for dynamic analysis and the use of equipment and other testing facilities available at the centre are also included. Discussions on case studies involving problems encountered in the industries, will form an important part of the course. These will include vibration problems in civil engineering that have been handled by the faculty members and also the participants. For this purpose, participants are advised to bring complete data on interesting vibration problems drawn from their own experience.

The course fee is Rs. 1000 for each participant from India and US \$ 250 for each participant from abroad. The application for participation in the course should reach SERC on or before 15 November 1986.

Mass-Produced Precast Concrete Components

The course is meant for senior and

middle level engineers from leading consulting/contracting firms, government organizations, universities, and research institutions who are already engaged in the design and construction of reinforced and prestressed concrete structures.

The course will cover: General principles of analysis and design, Materials, Standardization and modular coordination, Methods of manufacture, Mass-produced precast concrete components, e.g. railway sleepers, poles, piles, pipes, building components and industrial structures; Quality control, inspection and testing; New developments; and case studies.

The course fee is Rs. 800 per participant from India and US \$ 200 per participant from abroad. The application for participation in the course should reach SERC on or before 30 November 1986.

Application of Experimental Mechanics Techniques to Industrial Problems

The course is meant for engineers and scientists from industrial undertakings, consulting firms, government organizations, universities and research institutions who are engaged in the application of experimental mechanics techniques.

The course will broadly cover the following topics: Strain gauges and instrumentation; Photoelasticity; Holographic interferometry and holographic non destructive testing; Moire and speckle techniques; and Numerical techniques applied to experimental data for analysis. The main emphasis will be on practical aspects and industrial applications of these techniques. Choice of suitable experimental technique, similitude laws, design of experiments, measurements on models and prototypes will also be covered. Several case studies on industrial applications of experimental mechanics techniques will be presented.

The course fee is Rs. 1000 per participant from India and US \$ 250 per participant from abroad. The application for participation in the course should reach SERC on or before 15 December 1986. □

CSIR NEWS



A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

C. F. T. R. I., MYSORE

VOL. 36 NO. 21 15 NOVEMBER 1986



Japanese mint
CIMAP/Hybrid-77

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CSIR-DOD Memorandum of Understanding on Studies on Polymetallic Nodules

At a function held in CSIR, New Delhi, on 6 October 1986, a Memorandum of Understanding (MOU) relating to the programme on studies on polymetallic nodules was signed between CSIR and the Department of Ocean Development (DOD) of the Government of India. Dr A.P. Mitra, Director General, CSIR, and Secretary to the Department of Scientific & Industrial Research and Dr S.Z. Qasim, Secretary, DOD, signed the memorandum on behalf of their respective departments.

Since 1981, survey of polymetallic nodules has been an important project of the National Institute of Oceanography, Goa, the lead laboratory working in this area on behalf of DOD. The studies cover surveys and exploration with a view to demarcating candidate sites for recovery of polymetallic nodules in the Central Indian Ocean and R&D in the metallurgy of the nodules. Major funding for this pro-

gramme has been by DOD. The other CSIR laboratories associated with this programme are: Regional Research Laboratory, Bhubaneswar; National Metallurgical Laboratory, Jamshedpur and the National Geophysical Research Institute, Hyderabad.

According to MOU, the work programme in future will be approved by a Board of Management comprising Secretary, DOD — Chairman; Director General, Scientific & Industrial Research—Member; Additional Secretary, DOD—Member; Joint Secretary, DOD—Member; Financial Adviser, DOD—Member; Three representatives from CSIR including the national laboratories participating in the project—Members; and Director, DOD, dealing with the polymetallic nodules programme—Member-Secretary. The Chairman will have power to coopt any scientist/expert, other than mentioned above, to assist the Board in its deliberations.

In addition to the Board of Management, a working group for the CSIR-DOD programme would be constituted for the review and approval of long term and annual plans for the entire programme on polymetallic nodules. The group will have two representatives each from CSIR and DOD. The Member-Secretary of the Board of Management would be the Convener of the working group.

Welcoming the opportunity of formalizing the institutional linkage with CSIR, Dr Qasim expressed appreciation of the excellent cooperation DOD had received in the past from NIO/CSIR in undertaking oceanographic programmes of the Government of India. DG, CSIR assured the Department that CSIR was always ready to shoulder responsibilities entrusted to it by the Government at any time. He wanted DOD to consider if MOUs in regard to other areas could also be brought into effect. Shri T.K. Datta, Joint Adviser (Plg), CSIR, proposed a vote of thanks. □



Dr A.P. Mitra, Director General, CSIR (centre) and Dr S.Z. Qasim, Secretary, DOD, signing the CSIR-DOD memorandum of understanding on studies on polymetallic nodules

CIMAP produces Bulgarian rose oil

The oil of rose obtained from *Rosa damascena* Mill is the costliest and most important essential oil used in modern perfumery and cosmetic industries all over the world. Of the various types of rose oil produced in the world, oil obtained from the Bulgarian variety of *R. damascena* is considered to be the best in aroma value, and is preferred by the Perfumery/cosmetic industries. Bulgaria produces more than 80% of the total world production of high quality rose oil.

Rose oil industry in India is 500 years old. With a view to improving existing rose oil production, the Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow, introduced a few cuttings of Bulgarian rose at its Regional Centre in the Kashmir Valley five years ago. This variety was multiplied and indigenous method for propagation and cultivation of the plant was developed. The insti-

tute carried out experiments during the last three years and today it has a rose plantation of more than two hectares at its Regional Centre in Kashmir Valley. These experiments have shown that the yield of rose flowers and rose oil in Kashmir Valley is much higher as compared to Bulgaria. The institute has installed a semi-commercial pilot plant for production of rose oil, with the latest technology available in the world. The institute produced 1.3 kg high quality Bulgarian rose oil for the first time. Experiments carried out thus far indicate that India will be in a position to produce rose oil at the international price and enter the world market if this technology is exploited on commercial scale.

Cultivation of rose by farmers in Kashmir Valley will increase their income considerably and provide job opportunities to the rural poor. Even marginal and sub-marginal lands which are not used for cultivation of food crops, can be used for growing rose plants. □

CIMAP develops superior Japanese mint strains to boost production of mint oil and menthol

Japanese mint oil, which is obtained by steam distillation of the whole herb of *Mentha arvensis* Linn., is the best source of natural menthol which finds wide use in pharmaceutical and flavour industries. About 25 years ago the entire requirements of mint oil and menthol in India were met through imports. Owing to the efforts made by the Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, at present more than 600 tonnes mint oil and approximately 300 tonnes menthol are produced annually in tarai districts of Nainital, Rampur, Moradabad and Bareilly as well as certain areas of Punjab and Haryana with the result that the country has not only become self-sufficient in this important raw material but foreign exchange to the extent of about Rs 600-1200 lakh per annum is also saved, depending upon the prevailing market price.



CIMAP/MAS-1—super-menthol variety of Japanese mint developed by CIMAP, Lucknow.

About 10 years ago genetic stock of the mint strain introduced from Japan deteriorated to the extent that the menthol content had gone very low. CIMAP took up a programme for improvement of the existing strain in 1978 and developed a super-menthol variety designated as 'CIMAP/MAS-1', which is the best variety available in the world today. This variety has a high oil content 0.7-0.8% as compared to 0.4-0.6% oil in the existing strain. The oil from new variety has 81-85% menthol, 65% of which can be obtained by simple chilling, as compared to menthol content of about 65% in the existing strains where only 40-45% can be obtained by chilling. Released to the farmers during 1982-83, CIMAP/MAS-1 has now almost replaced the old strain in mint growing areas of the country. The crop is now cultivated on an area of approximately 11,000 ha and provides employment to more than 50,000 people in rural sector. The cultivation of new strain has resulted in considerable increase in the production of mint oil and India is now able to produce quality menthol at international

price. The country is also in a position to export this item to developing as well as developed countries of the world.

Under the genetic improvement programme of Japanese mint, CIMAP has recently made further breakthrough by evolving another high yielding strain designated as CIMAP/Hyb-77 with pedigree from a cross-CIMAP/MAS-2 and CIMAP/MA-2. This variety has all the good characteristics of CIMAP/MAS-1 and it gives 25-30% higher yield of biomass. The variety is also resistant to diseases and pests. It has been recently released to a limited number of farmers for commercial cultivation. □

IIP-ENCON film burner goes abroad

The Indian Institute of Petroleum, Dehra Dun's licensee, the ENCON Thermal Engineer (P) Ltd, has shipped recently the first export order of the IIP's low excess air film burners complete with accessories, to Mombasa (Kenya). As per the feedback from user industries, this burner saves more than 15% fuel oil than the existing burners and thus saves

the country's valuable foreign exchange to the tune of Rs 30 million annually. IIP's scientists have already bagged the prestigious NRDC award for this invention.

(See *CSIR News*, 35 (1985), 162). □

Studies on rheological properties of polymers

Shri V.D. Deuskar, while working at the National Chemical Laboratory, Pune, determined the zero shear viscosity, η° of polychloroprene and polybutadiene samples of different molecular weights over a wide range of concentration (1.0-35.0 gm/dl) in both good and theta solvents. The η° was determined in an ingenious way employing a Brookfield LVT viscometer. The η° for all polymer samples studied was strongly dependent on concentration. In order to correlate the viscosity data obtained at good and poor solvents, two methods, one given by Graessby and the other given by Drevál and coworkers involving the correlating variable, $C(\eta)$ were considered. In the former method the contraction of dimension of chains with concentration in good solvent was accounted, whereas in the second method, $C(\eta)$ was normalized by the Martin constant, K_M which is related to the flexibility of macromolecular chain and polymer solvent interaction. However the normalization of $C(\eta)$ by the Martin constant reduced all data for the two polymers to a common curve. The zero shear viscosity master curve obtained for each polymer is valid for entire concentration range independent of molecular weights and nature of solvents. On the other hand the correlation of data obtained by effecting the appropriate correction for variation of chain dimension with concentration was found to be better in polybutadiene rather than in polychloroprene.

Shri Deuskar carried out these studies under the guidance of Dr P. Roy Chowdhury of the laboratory and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

Ecological studies in relation to mangrove environment along the Goa coast

Mangrove ecosystems in the tropics are very productive and dynamic in nature. They have been utilized for fisheries and aquaculture since time immemorial. Shri T.G. Jagtap of the National Institute of Oceanography, Goa surveyed the mangroves of Goa region with the help of aerial photographs, and discussed the abiotic factors such as geology, geomorphology, topography, tide and currents and climatology of Goa region in relation to the mangrove distribution. The physico-chemical parameters, suspended load and organic matter from the mangrove environment (water and sediments) were studied at monthly intervals, at nine stations along the estuaries of Goa. Monthly data were collected on floral association in the mangrove ecosystems. The effects of petroleum products and pesticides on mangrove seedling of few species were studied.

The estuaries along the Goa coast are classified as micro tidal drowned vallies as tidal amplitude varies from 0.01 to 2.44 m. Soils of the tidal flat consist of silty sand and clay with abundant organic matter (4.56%). The atmospheric temperature ranges from 18.5 to 34.3°C. The interstitial salinity ranges from 2.37 to 45‰ while overlying water has a salinity range of 0 to 37‰. pH values in mangrove water range from 6.27 to 8.98. The dissolved oxygen fluctuates from 1.5 to 4.88 ml/l in overlying waters of mangrove. The concentration of PO_4 -P and NO_3 -N are found to be comparatively higher in the interstitial water. However, it is exactly reverse in the case of NO_2 -N concentrations. The suspended load is estimated to be in the range of 0.003 to 0.373 g/l (dry weight). An accretion is observed from October to April when salinity and temperature are generally high while erosion occurs during May to October when freshwater runoff is greater.

The dominant species are found to be

Rhizophora mucronata, *Sonneratia alba* and *Avicennia officinalis*. The total mangrove cover is estimated to be about 2000 hectares (90% of the mangrove area available along Mandovi-Zuari estuarine complex of Goa). The species diversity for the mangroves is estimated to be 0.57. The average stand density ranges from 461-851 trees/ha. On an average the stem volume is estimated to be 63m³/ha. The zonation of the mangrove is found to be mainly governed by salinity of the soil and water.

The chlorophylla concentration varies from 0 to 28 mg/m³ while values of phaeopigments range from 0 to 17.8 mg m³. A total of 44 species of associated marine algae belonging to 30 genera have been reported among which *Enteromorpha clathrata*, *Rhizoclonium kerneria*, *Catnella impudica* and *Caloglossa leprieurii* are common in the mangrove swamps of Goa. The luxuriant growth of a seagrass *Halophila beccarii* was observed only along the mangroves of Terekhol estuary. The biochemical studies on *Monostroma* sp., *Caloglossa leprieurii* and *Halophila beccarii* shows that these are moderately rich in protein contents.

The POC values in the mangrove water range from 0.03 to 9.94 g/m³ while PON values range from 0.012 to 3.4 g/m³. The POC values show a high correlation with suspended load. The organic carbon in the mangrove sediments ranges from 0.17 to 5.4% while total nitrogen contents vary from 0.03 to 1.9%. The average C : N ratio in the sediment varies from 7.2 : 1 to 13.4 : 1.

The general damage caused by oils are burning, yellowing and wilting of the leaves associated with root damage, causing retardation of growth. The survival rate is reduced in the seedlings of *Kandelia rheedii* treated with oils and pesticides.

The constant human pressure has severely degraded the mangroves along the Goa coast. A few suggestions and recommendations were made based on present investigation for the efficient management and proper utilization of these valuable mangrove ecosystems.

Shri Jagtap worked under the guidance of Dr A.G. Untawale and was awarded Ph.D. degree by the Shivaji University for his thesis based on these studies. □

Carrageenans from Indian Seaweeds

Shri R.G. Parikh of the Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, carried out a systematic investigation of the various factors which discriminate the character of carrageenans obtained from the seaweeds *Hypnea musciformis*, *H. valentiae*, *Halymenia venusta* and *Sarcocnema filiforme*. The aim of the study was to understand their role in evaluating the economic importance and subsequent utilization of these algal polysaccharides for various specific purposes. The studies revealed that the phycocolloid obtained from *Hypnea* species contain κ -carrageenan whereas *Halymenia* and *Sarcocnema* species contain λ - and ι -carrageenan respectively.

Hypnea musciformis was selected for detailed investigations because of its ready availability in substantial quantity. The parameters studied for the optimum extraction of carrageenan included: weed-water ratio, different pressures for extraction, and extraction with and without pretreatment with alkali.

The studies mainly pertained to the carrageenan content, compositional analysis and a study of physico-chemical properties of the products extracted from the species taken for the present study, which play an important role in the quality determination of the indigenously prepared carrageenans as well as the commercial samples. Based on these findings, a process for the extraction of κ -carrageenan from *Hypnea musciformis* was developed for the first time and its technical feasibility, along with predesign cost estimates worked out on bench scale.

Shri Parikh who worked under the guidance of Dr A.V. Rao, Head, R.O. Discipline has been awarded Ph.D. degree by Bhavnagar University for his thesis based on above studies. □

RRL-Jorhat scientists get NRDC award for developing carbonless copy paper

Shri C.N. Saikia, Shri P.P. Baruah, Shri B.P. Chaliha, and Dr. J.N. Baruah of the Regional Research Laboratory, Jorhat, figure among the winners of the Invention Promotion Award of the National Research Development Corporation of India, for outstanding achievements in the field of Science & Technology, announced on the eve of Independence Day.

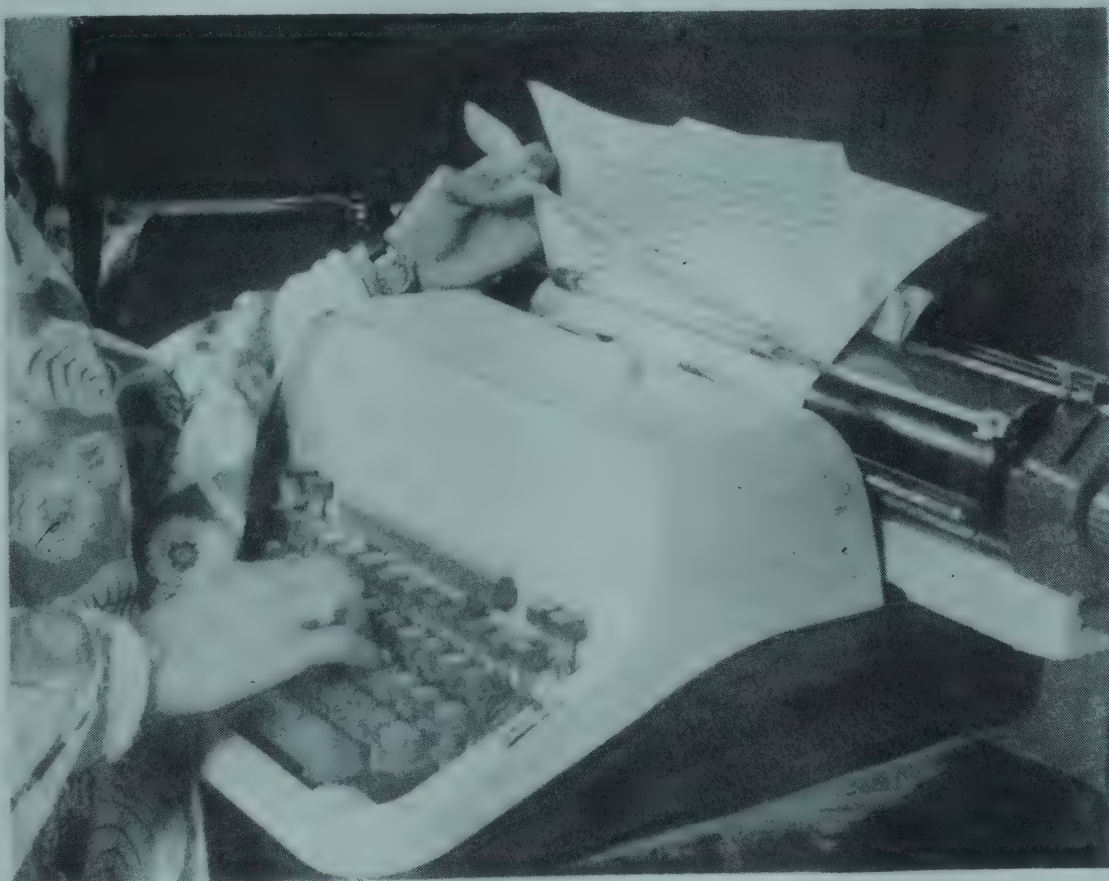
The team has been awarded Rs. 15,000 for developing a process for producing 'carbonless copy paper'. The project was led by Shri C.N. Saikia and coordinated by Shri B.P. Chaliha.

Carbonless copy paper (CCP) is one of the fast growing stationery items, with a world-wide growth rate of around 10 per cent per year. This paper has been produced for the first time in the country with the RRL technology and is getting a good domestic as well as export market. It is used for the production of a variety of multipart business forms, pay lists and accounts, drafts and cheques, air tickets,

invoices, etc. It is also used in the modern business machines like electronic data processing equipment, computers, teleprinters, etc.

CCP system has two colourless surfaces, one that acts as donor surface and the other as receptor surface. The process for production of CCP mainly involves microencapsulation of colourless dyes and thereby making the donor coated surface. Another paper is coated with a mixture of reactive chemicals, over which donor coated surface is put and when typed or hand written with a slight pressure the microcapsules of the colourless dyes are broken, which react with the colour activating chemical of the receptor sheet, thereby producing visible impressions.

The team of RRL-Jorhat scientists initiated research for the development of CCP for the first time in the country in the year 1975, and the process was ready for commercialization in 1980. The process was licensed to the Strobel Industries, Nizamabad, Andhra Pradesh, and the party is in commercial production since 1983. Another party at Bhopal has also



Typing on carbonless copy paper

taken licence and is expected to go into production shortly.

This team of scientists was also awarded the Invention Promotion Award on the 1985 Republic Day for outstanding contribution towards the invention of indigenous technology for 'Direct copy paper'.

Brief profiles of the inventors:

Dr. J.N. Baruah

Dr. J.N. Baruah, Director, RRL-Jorhat, holds B.Sc. (Hons.) degree from the Gauhati University, M.Sc. (Chemistry) degree from the Calcutta University and Ph.D. (Biochemistry) degree from the Texas Agricultural & Mechanical University (TAMU), USA. Dr. Baruah (born



1931) was Post Doctoral Research Fellow at TAMU during 1959-60 and FAO Andre Meyer Post Doctoral Fellow at the Massachusetts Institute of Technology during 1967-68. Prior to joining RRL-Jorhat in 1961, he served as a faculty member in J.B. College, Jorhat (1953-55), Assam Agricultural University, Jorhat (1955-56), TAMU (1956-60) and Assam Medical College, Dibrugarh (1960-61). He took over as the Director of RRL-Jorhat on 6 January 1982.

Dr. Baruah has more than 25 years experience of research in organic chemistry, biochemistry, fermentation technology and industrial R&D (technology

generation, assessment and transfer) with special reference to organic chemicals, drugs and pesticides. He was national coordinator for the Commonwealth Science Council (CSC) project on 'Management of water hyacinth'—an interdisciplinary project in which eight Commonwealth countries participated. He is coordinating the work on a multi-institutional project relating to the manufacture of paper and boards from this weed. Dr. Baruah is the recognized research guide for Ph.D. degree of Jadavpur, Kanpur, Gauhati, Dibrugarh and Assam Agricultural universities. Eight scholars have already received their Ph.D. degrees under his supervision and three more are carrying out their research work under his guidance.

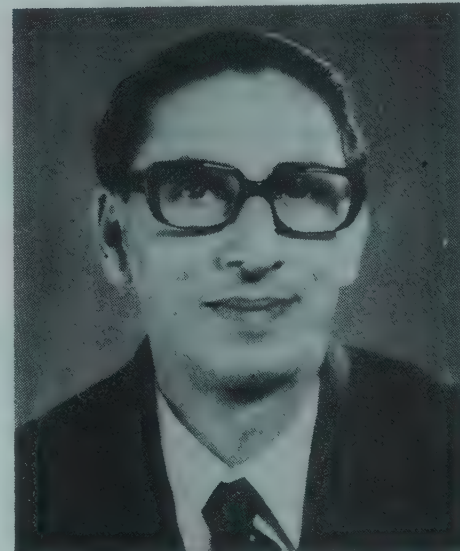
Dr. Baruah is the member of several reputed professional institutes and societies. He has visited USA, France, FRG, Switzerland, Italy, Guiana and Hongkong. In connection with CSC project on water hyacinth he visited (1982) several countries including Bangladesh, Thailand, Malayasia, Indonesia, Philippines, Fiji and Australia. Under the DAAD exchange programme, he visited FRG and The Netherlands in 1985.

Apart from receiving merit promotion in his service career, Dr. Baruah is also a recipient of the FAO Andre Meyer Fellowship award and institutional award for outstanding R&D work by Federation of Indian Chambers of Commerce & Industry. His name was included in World's Who's Who of Intellectuals, UK (1984). He has to his credit 21 patents, more than 200 scientific publications, and four books in Assamese.

Shri B.P. Chaliha

Shri B.P. Chaliha, Scientist F, is head of the RRL-Jorhat's Paper & Board Division. Shri Chaliha (born 1932) holds a B.Sc. (Hons) degree from the Gauhati University and M.Sc. (Tech.) degree from the Calcutta University. Prior to joining RRL Jorhat in 1961, he served as a lecturer in the Assam Engineering Institute, Gauhati, where he carried out extensive work related to: evaluation of different raw materials of the North-Eastern region for

pulp & paper making, rayon grade pulp, unconventional pulping techniques, deinking of waste paper, utilization of agro-industrial waste, speciality papers, paper products and boards.



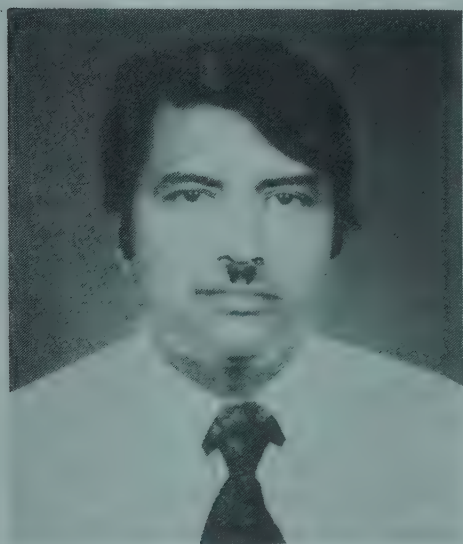
In 1971 he went on deputation to Poland and worked for a year in the Polish Institute of Pulp & Paper Technology and Ostroleka Pulp & Paper Mills. In 1977 he went to UK to acquaint himself with the latest developments in pulp & paper technology, particularly speciality papers and boards, and utilization of agrowaste.

Shri Chaliha and his team have developed a number of processes, particularly in the field of speciality papers, boards and paper products, many of which have been commercialized. Shri Chaliha has 80 publications and 25 patents to his credit. He is a member of the Indian Pulp & Paper Technical Association, and Canadian Pulp & Paper Association. He is recipient of the certificate of merit from the Institution of Engineers (India) (1968) and Invention Promotion Board Award (1972). Recently, he received the Dr. P.C. Goswami Award (1984) for outstanding R&D work in the North-Eastern region.

Shri C.N. Saikia

Shri C.N. Saikia, Scientist E, is Project Leader of the team working on speciality papers at RRL-Jorhat. Shri Saikia holds a B.Sc. (Hons.) degree in chemistry from

the Gauhati University and B.Sc. (Tech.) from the Bombay University. He has received advanced training in pulp and paper technology, particularly speciality

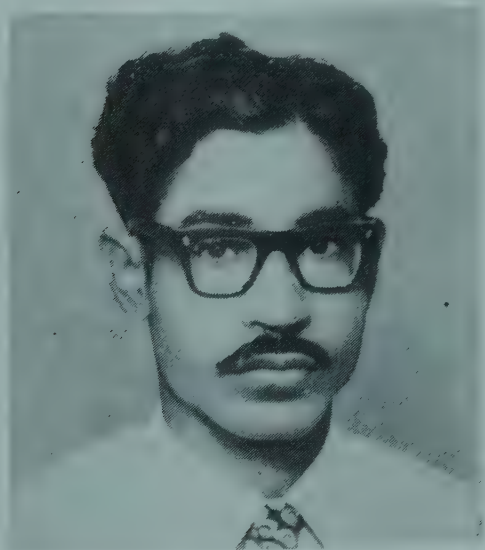


papers, in the Polish Pulp and Paper Research Institute, and inplant training in a few speciality paper manufacturing mills in Poland.

Shri Saikia has 27 publications and 10 patents to his credit, besides many radio talks on various popular science subjects. Also, he is member of the ISI Committee on Paper and its Products.

Shri P.P. Baruah

Shri P.P. Baruah is working as Scientist B in the RRL-Jorhat's Paper & Board Division. He did his B.Sc. from the Gauhati University and subsequently obtained



AIC (India) and LL.B. (Dib.). His current research interest relates to (i) speciality

papers, and (ii) application and utilization of agricultural waste and industrial byproducts in paper industry. Shri Baruah has six papers and many patents to his credit. He was also awarded Invention Promotion Board Award in 1972.

Polyaramide Fibre

The work carried out by Dr. N. Balasubramanian, R&D centre of Asbestos Cement Limited, Bangalore, Smt. P. Kanakalatha, Dr. P.S. Raman, Shri M.K. Sridhar of the National Aeronautical Laboratory, Bangalore, and Ms. R. Vasantha Kumari of IIT, Madras, in the development of 'polyaramide fibre' has been given due recognition, and their names have been included in the list of inventors for which an award of Rs. 15,000 was given jointly to Dr. K.V.C. Rao, Dr. G. Govindan and Dr. S. Someswara Rao of the Vikram Sarabhai Space Centre, Trivandrum, by NRDC in January 1986. □

West Bengal Minister for Environment visits NEERI

"We need the guidance of NEERI to surmount the many environmental problems faced by our State", said Shri B. Mukherjee, West Bengal's Minister for Environment, while addressing the Seminar Group of NEERI, Nagpur, on 22 October 1986.

Dwelling on the many environmental problems of West Bengal, Shri Mukherjee said that Durgapur is the worst polluted city of the state due to haphazard industrial development and improper environmental planning. Arsenic in groundwater, huge amounts of fly ash from thermal power plants, air pollution due to foundries in Shibpur near the Bengal Engineering College and hazardous wastes from chemical and fertilizer industries are the problems which need to be solved with the guidance of experts, he said.

NEERI scientists informed the minister of the numerous R&D activities carried out by NEERI during the last 25 years which have helped solve some of

the environmental problems of West Bengal. NEERI has monitored the air quality of Calcutta and Howrah cities on behalf of the Calcutta Metropolitan Development Authority (CMDA) and water quality of the Hoogly Estuary. At present, under the Ganga Action Plan, NEERI is monitoring the water quality of the Ganga and is assisting Bankura District in solving its drinking water problem under the National Water Technology Mission Project being implemented by NEERI on behalf of CSIR. The study on environmental impact by NEERI at Calcutta Port is in progress under the sponsorship of the Calcutta Port Trust. NEERI has also imparted training in air and water quality monitoring to the personnel of CMDA, and it assists the Calcutta and Jadhavpur universities in their teaching programmes. □

NEERI's Background Document on Disaster Management

A background document entitled, 'Chemical Disaster Management: Selected Information Sources' was presented on the occasion of the four-day World Health Organisation (WHO)-sponsored international workshop on 'Disaster Management' which concluded at the National Environmental Engineering Research Institute (NEERI), Nagpur on 17 October 1986.

The document, compiled by Smt. S.N. Sinnarkar, Shri S.K. Kesarwani and Shri S.G. Bhat of NEERI's Library & Documentation Division, will be included in the final proceedings which the organizers of the workshop intend to bring out.

Speaking on the occasion, Shri S.G. Bhat, Scientist and Head, L&D Division, NEERI, underlined the need to establish 'disaster information centres' at the national and regional levels. It was observed that crisis management and prevention of chemical disasters could be managed effectively and efficiently if requisite information is made available timely. He urged the participants of the workshop to recommend the compila-

tion of a 'Guide to Sources of Information' and the establishment of disaster information centres. He added that NEERI is trying to establish a strong information base which would include 'Hazardous Waste Management', and would be useful for its R&D programme. □

Wasteland Development Board chairman visits CSMCRI

Dr (Smt) Kamla Chaudhary, Chairman, National Wasteland Development Board (NWDB), and Shri M. Varadarajan, Member Secretary, NWDB, visited the Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, and its field plantations of halophytes and jojoba at Hathab and Zanjmer respectively, during 14-15 September 1986.

While appreciating the work done on wasteland utilization (coastal sand dunes), especially on jojoba, the NWDB chairman emphasized the need to involve

people, possibly with the help of forming cooperatives. She stressed the importance of linkages between scientists and users, while addressing a gathering of forest officials, industrialists, private entrepreneurs and local farmers. She also suggested that scientists should also take up some extension work and prepare models alongwith their research activities so that their findings reach the grass root level.

She suggested the preparation of a project proposal regarding jojoba, the development cooperatives and the linkages with the processing units that may be required. □

PROGRESS REPORTS

NPL ANNUAL REPORT: 1984-85

The annual report of the National Physical Laboratory (NPL), New Delhi, shows that the major activities of the laboratory during the period 1984-85 continued to be in the area of: Measurements stand-

ards (mechanical, thermal, optical, electrical and electronic), Materials, components and devices and their characterization, Radio & atmospheric sciences, Solar energy, Cryogenics and Applied projects of contemporary interest.

NPL's primary responsibility is the custody, maintenance and updating of the standards of measurements and establishment and operation of the calibration service programme. The laboratory has brought accuracies of the base and derived parameters to the required 'Echelon I' level. International intercomparisons have been carried out either through bilateral exchange programmes (India-USSR, India-FRG) or through Asia-Pacific Metrology Programme which has the involvement of 18 countries. A gradual shift to the concept of fundamental constants is being attempted. Significant contributions made in the area of measurement standards are: (1) Accuracy of time & frequency standards has been improved to 1 part in 10^{12} . Clock synchronization accuracy of 10 micro-seconds has been achieved; (2) DC voltage standard is now traceable to Josephson effect with uncertainty of 5 parts in 10^7 . AC Josephson effect has been used to generate quantized voltage at 1 mV level; (3) Intercomparison of dc voltage standard with Australia, China, New Zealand and USSR has confirmed an agreement within 1 ppm; (4) Accuracy of 'farad' has been improved to 2 parts in 10^7 ; (5) Frequency calibration accuracy of 1 part in 10^{10} has been achieved from 0.001 Hz to 1 GHz and a few parts in 10^{10} up to 26 GHz for calibrating frequency counters, signal generators, etc; (6) A dead weight of 100KN has been established with an uncertainty of 2 parts in 10^5 ; (7) Iodine stabilized He-Ne lasers emitting 633 nm radiation have been established. This is one of the recommended radiations for the realization of the 'metre' in terms of the 1983 definition of metre; (8) An accuracy of 5 parts in 10^3 has been achieved in the measurement of luminous intensity; (9) A confidence in temperature measurement to an accuracy of 0.1°C , in the range 0°C to 1000°C has been established through international



Dr E.R.R. Iyengar, Discipline of Phytosalininity, CSMCRI, explaining the nature of jojoba plant and its cultivation on waste coastal sand dunes to Dr (Smt) Kamla Chaudhary, Chairman, National Wasteland Development Board, during her visit to CSMCRI Field Station at Zanjmer village.

intercomparisons; (10) Primary standards for measurement of pressure up to 10 kbar with 150 ppm accuracy have been established; similarly vacuum standards measurement range has been extended down to 10^{-7} mbar; (11) Mass measurement capability has been improved from 1 part in 10^6 to 1 part in 10^7 ; (12) A hydrostatic (absolute) method has improved the accuracy of calibration of reference standard hydrometers from 1 part in 10^4 to 1 part in 10^5 ; (13) Ultrasonics output power measurement facility has been established with overall uncertainty of +5%. Techniques have been developed to estimate vibration amplitude down to 50A.

A major conceptual advancement made is the linking of electrical parameters such as volt, farad, ohm and ampere with second and metre (He-Ne laser: 1 part in 10^{10}) through Josephson effect (5 parts in 10^7) and calculable capacitor.

R&D activities of the laboratory in the field of materials during 1984-85 were related to (i) carbon fibres, carbon-carbon composites and glassy carbons, (ii) piezoelectric materials for high power ultrasonic applications, (iii) electro-optic materials, (iv) cast silicon ingots for photo-voltaic applications, (v) superconducting materials, and (vi) super-hard materials. New devices and components investigated include: (i) photo-voltaic and photoconductive cells (polycrystalline silicon solar cells, screen printed CdS/Cu₂S solar cells, CdS photoconducting cells), (ii) β -alumina tubes for Na-S batteries (a joint effort of NPL, CECRI, and RRC, Kalpakkam), (iii) ultrasonic and piezo-electric devices, (iv) thin film devices (space-qualified interference filters for Earth Resources Satellite, gun-sight reflector glass components for defence applications) and (v) feasibility studies on xero-radiography.

For both materials and devices development, a first rate facility for characterization of materials, including electronic materials, is needed. The main emphasis in this area has been on the development of a variety of locally constructed high-quality X-ray diffractometers for different types enabling the studies on micro-struc-

tural changes in single crystals.

In the radio and atmospheric sciences, major activities were related to: (i) Indian Middle Atmosphere Programme (IMAP) (ii) fabrication of payloads for SROSS Aeronomy Satellite (one of the two scientific mission satellites expected to be launched during the Seventh Five Year Plan period), and (iii) a major radar and communication service programme serving Defence establishments, OCS, P&T, Railways and ISRO.

Under IMAP, 2 balloon flights were conducted for the measurement of stratospheric ionization and five rocket experiments were conducted for the measurement of ozone. A laser-heterodyne system for measuring atmospheric minor species was made operational. A UV-B photometer continues to be operational since the beginning of IMAP in January 1982. A gas chromatograph facility for atmospheric minor species was commissioned and several special IMAP documents were prepared.

The laboratory has successfully carried out, during the four Antarctic expeditions, a vigorous programme on the study of upper atmosphere, ionosphere and radio communication. An entirely new concept has been introduced through simultaneous observations in Dakshin Gangotri and in India. Both the liquid air and liquid nitrogen plants were in production. The operation of a 7T superconducting magnet, fabricated in the laboratory was a significant development.

The new sponsored projects in progress, supported by outside agencies, were: (i) investigations on hydrogenated amorphous silicon films, supported by DNES, and (ii) Development of high density carbon-carbon composites, sponsored by DRDL, Hyderabad.

The emphasis during the period was on: (i) automation in measurements and other experiments wherever possible, (ii) micro-processor-based systems (iii) establishment of a major computer facility, and (iv) improvement of environmental conditions (new clean room facilities) for special experiments.

The modernization steps taken for bet-

ter management were: introduction of the word processors for administration, accounts and stores; in-house training for computer programming and training of helpers to ITI level in the workshop.

Three processes, viz. (i) Ceramic enclosed sensors for platinum resistance thermometers, (ii) Flat plate solar collectors and (iii) Silver impregnated graphite contacts were released to the industry.

The laboratory also rendered consultancy services to various organizations in different fields, such as noise reduction, acoustic treatment, designing of auditoria, designing of quality control laboratories for lamps and luminaire industry and radio communication.

Calibration of a large number of reference standards and measuring instruments from outside agencies was undertaken. The calibration revenue realized (at very normal calibration fee) during the period amounted to Rs 8.814 lakh and the number of calibration reports issued were 2831.

More than 100 papers were published in national and international journals and 50 were presented in national conferences and symposia. □

NEW PUBLICATIONS

Inventory of Stations and Cruises of R.V. Gaveshani

The collection of oceanographic data is expensive and therefore proper archiving, analyses and dissemination of the data are considered important. The National Institute of Oceanography, Goa, has now initiated publishing inventory of data collected in various cruises. First in the series 'Inventory of stations and cruises of R.V. Gaveshani' has been published recently. It contains in computerized tabular form, the basic information about the cruises undertaken by the research vessel since its commissioning in February 1976, in two volumes. Each volume gives the cruise number, area of operation, dates, names of chief scientist participants, station positions and types of observations made. The volumes also contain maps showing the station posi-

tions. In the documents, the standard three digit ROSCOP code, changed into synonyms, has been used for the parameter identification. These also represent the data holdings of the Data Centre of the institute. Volume I contains the information for the years 1976-80 while volume II provides similar information for the period 1981-85. The publications are priced at Rs. 80 or \$ 20 per volume and can be had from the Publications Division of the institute.

The volumes were released at a simple function, held at NIO on 19 September 1986, by Dr. S.Z. Qasim, Secretary, Department of Ocean Development, Government of India.

Study of Effluent of Coal Washeries to Evolve Efficient Treatment Process

The Central Mining Research Station (CMRS), Dhanbad, took up studies of the effluents of coal washeries, which are the main pollutants of Damodar river, making its water unfit for domestic consumption. These studies were carried out during the period December 1979 to December 1985. On the basis of this investigation it has been possible to identify the extent of loss of coal fine and pollution load going to river as well as recommend the measures to control the river pollution due to washery effluents for the improvement of environment.

The investigation has also shown that with proper modifications and scientific method of working, much improvement in recovery of coal fine as well as quality of final effluent is possible even with the existing system of effluent treatment.

Better methods of effluent treatment have also been recommended with a view to improving the quality of the river water as well as to recover a major portion of coal fine (about 10 to 200 tonnes/day) which is being lost with the effluents by the washeries at present.

The title publication covers the studies carried out and the recommendations made based on these studies.

These studies were carried out by Shri N.N. Banerjee with occasional assistance

from : Shri A. Dasgupta, Shri K.N. Mondal, and Shri M.L. Mahato.

Enquiries pertaining to the publication may be addressed to the Director, CMRS, Dhanbad, 826 001. □

CONFERENCE BRIEFS

Tenth International Coal Preparation Congress

At the Tenth International Coal Preparation Congress, held at Edmonton, Alberta, Canada, during 1-5 September 1986, a paper entitled 'Chemicals from Coal Washery Tailings' by K.C. Nath, K. Raja, G.H. Karmakar and S.K. Hazra (Central Fuel Research Institute, Dhanbad) was presented, in absentia, in the technical session on Dewatering and Utilization of Plant Discard.

Coal washeries generate considerable proportion of waste solids popularly known as washery rejects. Under Indian conditions, this may be as high as 20-40% having ash content usually between 60 and 80% depending upon the nature of coal and techniques of beneficiation. The coal waste contains a good number of minerals and trace elements of which the major metallic components are aluminium and iron. The possibility of recovery of such metallic constituents was indicated earlier.

The paper elaborated the chemical reactions involving acid treatment in retrieval of the minerals. It also discussed the techno-economic viability of the process, based on laboratory scale studies.

According to the paper, the process is technically and economically feasible under the prevailing market price for aluminium sulphate; favourable conditions being a 50 tonnes/day plant fed with raw materials varying in cost up to Rs. 25/ tonne or a 200 tonnes/day plant fed with raw materials costing up to Rs. 75/ tonne.

VI International Congress on Plant Tissue and Cell Culture

Dr. G.A. Ravishankar, Central Food Technological Research Institute (CFTRI)

Mysore, attended VI International Congress on Plant Tissue and Cell Culture, organized by International Association for Plant Tissue and Cell Culture, at Minneapolis, USA, during 3-8 August 1986. It was attended by 1500 delegates representing over 60 countries.

The congress symposium focussed on following areas : Direct gene transfer for production of transgenic plants ; Secondary metabolites from plant cells ; and Plant cell biology in 21st century : The needs of plant cell and tissue culture.

Besides this, all aspects of plant tissue cell culture ranging from cell structure and differentiation to the application in agriculture, horticulture and industry were discussed. It was observed that the technique in the last four years had assumed tremendous application. Over 30 industries which participated in the congress had been actually using the technique on commercial scale. Noteworthy areas of application being the production of metabolites such as Shikonin, an antibacterial, anti-inflammatory substance from *Lithospermum erythrorhizon* cultures ; Berberin, an intestinal antimicrobial drug from *Coptis japonica* ; Digoxin by biotransformation of diogitoxin in *Digitalis lanata*. Use of fungal elicitors for increased metabolite production is receiving great attention. Somaclonal variation for production of salt tolerant, drought resistant and disease resistant plants in cereals and other crops is being done on commercial scale. Somatic embryogenesis coupled to the production of synthetic seeds has brought this technology to the sphere of automation and direct application to field conditions. Plants resistant to herbicides and pesticides have been produced exploiting chloroplast inherited traits and engineered plants are commercially available. Genetically engineered plants are produced using Agrobacterium system or by direct gene transfer, using electroporation and microinjection methods. Gene for toxic protein from *Bacillus thuringiensis* has been transferred and expressed in tobacco plants. Micropropagation of ornamentals, herbaceous plants, and woody trees is being done on

massive scale. Haploids have been used to derive cultivars from rice, wheat, potato, rapeseed, triticale, tobacco, etc.

Improvement in vegetables, such as tomato for thick skin; potato to produce white skin and microtubers for seed materials are few examples of progress in this area. Areas such as photoautotrophic cell culture, cell immobilizations, mass cultivation of plant cells and cryopreservation are receiving great attention for future commercial application.

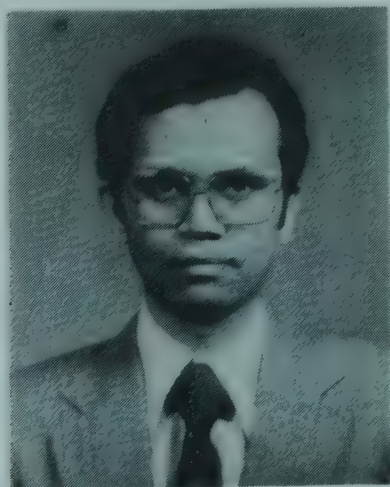
Dr. Ravishankar presented two papers in the area of secondary metabolites from *Dioscorea deltoidea* and *Mentha piperita*. He also visited some laboratories in the University of Minnesota doing active R&D work in tissue culture as applied in horticulture, agriculture and biotechnology. His visit was sponsored by CFTRI and IAPTC. □

Three NCL scientists awarded Director's Grade

Three scientists of the National Chemical Laboratory, Pune, viz. Dr R.A. Mashelkar, Dr Paul Ratnasamy and Dr John Barnabas have been promoted to Director's grade with effect from 29 September 1986 in recognition of their scientific contributions.

Dr R.A. Mashelkar

Dr R.A. Mashelkar, who heads the Chemical Engineering Division of NCL, is well known for his outstanding contributions



to polymer science and engineering. At NCL he has been successful in building a flourishing school in this area with

accent on both theory and practice. This group has major programmes on engineering polymers, polymer alloys, oil field polymers, etc. and has made major headway in helping the Indian polymer industry. Development of *Jalsbakti* (a superabsorbing polymer), DROP (drag reducing oil soluble polymers), sulphochlorinated polyethylene (an important high performance elastomer), application of computer modelling and simulation for improvement of productivity of industrial polyethylene terephthalate reactors are some of his important contributions in recent years. His individual contributions in transport phenomena in macromolecular media especially with reference to stress induced macromolecular migration, unified free volume models, etc. are well known nationally and internationally.

Dr Mashelkar has over 130 papers in international journals and seven books in the areas of his specialization. He has won various honours and awards including S.S. Bhatnagar Prize (1982), Herdilia Award (1982), Santappa Silver Jubilee Award (1983), Chinnamaul Memorial Prize (1983), 'Role of Honour (1984)' Award of Giants International, FASc (1983), FNA (1984), President, Society for Polymer Science (1984-86), Associate Member, International Committee on Rheology (1980-84), UGC National Lecturer in Engineering and Technology (1985-86), Hon. Visiting Professor at the University of Salford (1985-86) and the University of Pune (1985-86), Visiting Fellow at the University of Bombay (1965), and K.G. Naik Gold Medal (1985).

Dr Paul Ratnasamy

Dr Paul Ratnasamy, who heads the Inorganic Chemistry Division of NCL is internationally recognized for his outstanding contributions in the area of catalysis. The Indian National Science Academy, New Delhi, has also elected Dr. Ratnasamy as its Fellow—a top honour which has come to him in recognition of his outstanding contributions in the area of catalysis.

Dr Ratnasamy has contributed significantly to the development of zeolite catalysts with industrial applications. These include the discovery and synthesis of new catalysts like iron and lanthanum silicates which have opened new



vistas in the structural and catalytic chemistry of zeolites. These new zeolites (designated as ENCILITES for NCL zeolites) have proved superior to the conventional aluminium zeolites for many industrial applications like xylene isomerization, naphtha reforming, toluene disproportionation, hydrode-waxing, etc. These zeolites are already manufactured commercially by two parties in India and licensed to one firm in UK. This is the first catalyst, and, so far the only catalyst discovered in India to be manufactured abroad. Today, as a result of the dedicated efforts of Dr Ratnasamy, NCL has become one of the top five organizations in the world engaged in both basic and applied research in zeolite catalysts.

Dr Ratnasamy's contributions in the field of zeolite catalysis have resulted in over 80 publications in international journals which have won him wide acclaim both nationally and internationally. Dr Ratnasamy has 21 Indian patents to his credit. Several foreign patent applications corresponding to Indian patents on synthetic zeolites and other novel catalysts have been filed in a number of selected countries.

Dr Ratnasamy is recipient of many honours. Some of the important ones are: Senior Fellow, Alexander Von

Humboldt Foundation, FRG (1976-77); Secretary, Catalysis Society of India (1980-82); Coordinator, Indo-Soviet Cooperation Programme in Catalysis (1984); UNDP Consultant and Course Director for UNDP/ UNESCO sponsored 'International Course on Heterogeneous Catalysis', Chile (Sep. 1985), VASVIK Industrial Research Award for Chemical Sciences (1982), Shanti Swarup Bhatnagar Prize (1984) and very recently Fellowship of the Indian National Science Academy (1986).

Prof. John Barnabas

Professor John Barnabas, joined NCL on 15 May 1985 as Scientist F and Head of the Division of Biochemistry. Dr Barnabas was a Professor of Biochemistry at



the Ahmednagar College and has had a distinguished academic career. He initiated research activities at Ahmednagar College in 1954 and during his long and rewarding association with college, set up the Department of Biochemistry and developed a centre at the college for post-graduate studies in biological sciences. He has made outstanding contributions in the field of evolutionary genetics and molecular evolution through his studies on the sequences of haemoglobins. He has also developed theoretical methods which make it possible to use sequences of proteins and nucleic acids to measure not only evolutionary change as these molecules evolve but also to get an overview of evolution of the organisms that carry these macromolecules.

Dr Barnabas, after joining NCL, has

reorganized the research activities of the division of Biochemical sciences under two main categories: Plant sciences, and Microbial-animal sciences. In the plant sciences, special emphasis has been given to molecular biology of seed storage proteins and propagation of plants through tissue culture. In the microbial-animal sciences, special emphasis given to has been structural biology of carbohydrate-based enzymes of industrial importance, including their overproduction through recombinant DNA approaches and immobilization techniques. To bridge these areas, research activities on molecular evolutionary biology which derives interrelationships of organisms through computer-based geneological analyses of protein and nucleic acid sequences data sets have been introduced.

Dr Barnabas has over 65 papers in the field of biochemical genetics and evolution which have won him wide acclaim both nationally and internationally. He has won various honours and awards: Jawaharlal Nehru Fellow (1983-85), S.S. Bhatnagar award (1974), Sreenivasayya Memorial award (1976), FASc (1976), FNA (1979), President, Society of Biological Chemists of India (1984-86), Member, Science Advisory Committee to the Cabinet (SACC) (1983-85), Councillor, International Society for the Study of the Origin of Life (1980-1983), Fulbright-Hayes Visiting Scientist, Georgetown University Medical Centre (1979-80) and U.G.C. National Lecturer (1978-79). □

PERSONNEL NEWS

Appointments/Promotions

At the Central Glass and Ceramic Research Institute (CGCRI), Calcutta, the following personnel have been promoted, on assessment, with effect from the dates given in the parentheses:

As Scientist EII

Shri S.K. Mookerjee (30 Aug. 1985) and Dr. S.K. Banerjee (28 Feb. 1986).

As Scientist EI

Shri S.K. Das (15 April 1985), Shri D.B.

Gupta (2 Jan. 1986) and Dr. A.K. Chowdhury (15 March 1986).

As Scientist C

Shri S. Chakraborty (7 April 1985), Dr. S. Ghatak (2 May 1985), Dr. A.K. Roy (18 July 1985), Shri N.C. Biswas (1 Aug. 1985), Dr. (Smt.) M. Saha, Dr. K. Sengupta, Dr. A.S. Sanyal, Shri A.K. Nandi, Shri M.C. Ghosh, Dr. S.K. Bhattacharya, Shri S.K. Chattopadhyay, Shri S.R. Das, Shri S.K. Sen, Shri S.K. Neogi, Shri A. Ghosh, Shri P. Kundu, Shri S.K. Basu, Shri A.K. Nandi and Shri B.K. Chakraborty (all the fifteen from 1 Feb. 1986).

As Scientist B

Shri P. Roy and Smt. Dipali Kundu (both from 1 Feb. 1986).

★ ★ ★

At the Indian Institute of Chemical Biology, Calcutta, Shri Sumeru Gupta has been promoted on assessment as Executive Engineer with effect from 1 February 1986.

★ ★ ★

At the Regional Research Laboratory, Jammu, Shri H.R. Gupta has been promoted as Administrative Officer (Gr I) with effect from 2, September 1986.

★ ★ ★

Dr. K. Subramanyam has joined the Agromony and Soil Science, Discipline of the Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow, as Scientist C, with effect from 24 March 1986.

★ ★ ★

Shri S. Mani has joined CIMAP (Regional Centre, Kodaikanal) as Scientist B, with effect from 24 February 1986.

CLARIFICATION

National Seminar on Indian Patent System and the Paris Convention: Legal Perspectives

The title seminar organized by the Faculty of Law of Delhi University received some financial support from the National Institute of Science, Technology and Development Studies (NISTADS), New Delhi. The views expressed in the news item published in *CSIR News*, 36(1986), 118 are those of the participants and not of NISTADS. □

CSIR NEWS



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C.S.I.R. DIRECTORS' CONFERENCE 4-5, NOVEMBER, 1986



Shri K.R. Narayanan, Minister of State for Science & Technology and Vice President, CSIR addressing the CSIR Directors' Conference held in New Delhi on 4-5 November 1986. On his right is Dr. A.P. Mitra, Director General, CSIR and left Dr. Ram K. Iyengar, Additional Director General, CSIR,

Shri K.R. Narayanan takes over as Minister of State for Science & Technology Atomic Energy, Space, Electronics & Ocean Development and Vice President, Council of Scientific & Industrial Research

Shri K.R. Narayanan has been appointed Minister of State for Science & Technology, Atomic Energy, Space, Electronics and Ocean Development and Vice-President, Council of Scientific & Industrial Research, with effect from 22 October 1986. A distinguished diplomat, Shri Narayanan is a scholar of standing in Econom-



ics, Political Science, English Literature and a renowned journalist. Given below is a brief career profile of Shri Narayanan:

Born in Kerala on 4 February 1921, Shri Narayanan took his M.A. degree in English Literature from the University of Travancore, Kerala, in 1943, standing first in the university. He went to the London School of Economics on a Tata scholarship in 1945 and took his B.Sc. degree (Econ) with first class honours specialising in Political Science.

Starting his career as a university lecturer, Shri Narayanan moved into journalism working with *The Hindu*, Madras, and *The Times of India*, Bombay. He also worked as the London Correspondent of *Social Welfare*, Bombay, while a student at the London School of Economics.

Shri Narayanan joined the Indian Foreign Service in 1949. He served with the Indian missions in Rangoon, Tokyo, London, Australia and Hanoi. He was India's Ambassador to Thailand (1967-69), Turkey (1973-75), People's Republic of China (1976-79) and USA (1980-84).

Shri Narayanan also held important positions in the Ministry of External Affairs, having headed the East Asia, External Publicity and Policy Planning Divisions. He became Additional Secretary in the ministry in 1975-76 and Secretary in 1976.

Shri Narayanan was awarded the Jawaharlal Nehru Fellowship in 1970-72 for a study of Nehru's Non-alignment.

He was a member of the Indian delegation to the United Nations General Assembly in 1979. From 1979 to 1980 he was Vice Chancellor of the Jawaharlal Nehru University, Delhi.

Shri Narayanan is Honorary Fellow of the London School of Economics, and of the Centre for Development Studies, Trivandrum, Kerala.

Shri Narayanan stood for election to the Parliament from the Ottapalam constituency in Kerala, in December 1984 and was elected to Lok Sabha. He was appointed Minister of State for Planning on 1 January 1985. On 25 September 1985, he was appointed Minister of State for External Affairs.

Author of many articles on literature, politics and international affairs, Shri Narayanan has also written two books: *Non-Alignment in Contemporary International Relations* (jointly with Prof. K.P. Misra) and *India and America: Essays in Understanding*. □

Conference of Directors of National Laboratories

A conference of Directors and Heads of national laboratories of CSIR was held at the India International Centre, New Delhi, on 4-5 November 1986. Dr S. Varadajan, Chief Consultant, Planning Commission; Dr Vasant R. Gowariker, Secretary, Department of Scientific & Technology; Shri Ashok Parthasarathy, Additional Secretary, Department of Scientific & Industrial Research and Shri N.K. Sharma, Managing Director, National Research Development Corporation of India also attended the conference. The conference was organized in three technical sessions, a parallel session to discuss reports of three special committees and a plenary session.

Welcoming the participants, Dr A.P. Mitra, Director General, CSIR, gave an overview of the organizational structure of CSIR and national laboratories. He observed that an organization was judged

by the amount of funds it generated by way of transfer of technologies, etc. But that was not the only way to judge it. CSIR was involved in several societal missions, concerned with basic data generation (e.g. E.E.Z.) and turning out high quality work in basic science. On the basis of areas of excellence of laboratories, thrust areas and missions had been identified. Thirteen such areas had reached the projectization stage. The purpose of the conference was to consider these areas in the projectized form. Dealing with the nature and extent of collaboration CSIR has with other departments such as Department of Electronics, Department of Space, Department of Non-Conventional Energy Sources and the Department of Ocean Development, Dr Mitra mentioned that a memorandum of understanding had recently been entered into with the Department of Ocean Devel-



Dr G. Thyagarajan, Director, CLRI, addressing the CSIR Directors Conference

opment for the programme on polymetallic nodules.

Dr Mitra further said that in terms of facilities and capabilities, the national laboratories had much to offer. He was convinced that high quality science was being done in these laboratories. The annual turn-over of the industry as a result of the commercialization of CSIR technologies was somewhere in the range of Rs 500 crore. A number of awards had been conferred on scientists of national laboratories and they were also members of important committees. However, he felt that the average age of scientists was still high and efforts should be made to bring it down.

Addressing the gathering, Shri K.R. Narayanan, Vice President, CSIR, said that he was very happy to be in the midst of Directors of national laboratories, Heads of scientific agencies and other scientists who were working in the frontiers of knowledge and grappling with the problems of society and the country. Though he was new to CSIR in the official sense, he had known the organization much before because it was one of the oldest

organizations established due to the vision of Shri Jawaharlal Nehru and the practical genius of Smt Indira Gandhi who gave it so much support and encouragement. Because of this support, CSIR has grown to be an empire of science in India with 40 national laboratories, 101 field centres and about 22,000 people. He recalled an incident when in China his statement that India was the third largest force in terms of scientific and technical manpower was received with wonderment and awe.

The kind of scientific advances we have made is a matter of envy for all, particularly the developing countries. Our scientists have been made fellows of prestigious academies and presidents of the renowned international institutions. After Raman we might have missed the Nobel Prize but two scientists of Indian origin have since been awarded the Nobel Prize. It is a matter of pride that spectacular advances have been made by our scientists. Shri Narayanan said he was happy to learn that the technology generated by CSIR laboratories had resulted in industrial production giving a

turnover of Rs 500 crore annually.

The CSIR Vice President narrated a recent incident while on a cruise as a member of a scientific expedition undertaken by ORV *Sagar Kanya*. There were several other Members of Parliament with him many of whom did not know what practical application there could be or what was exactly the use of the research carried out with the ship. It was explained to them later that the seabed survey undertaken by NIO was to help rebuild the Mandovi bridge at Goa, and there lay the importance of oceanographic research. "Today, CSIR is able to give results in priority areas of social and economic development. But, even the educated people tend to look upon scientific institutions as white elephants. We have to improve our public relations and bring out popular publications so that MPs, the Press and the public could be properly informed". Shri Narayanan added.

Shri Narayanan said there could be no technology without science because technology originated from science. He was happy to see that in CSIR there was a

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system by which scientists could be appointed Directors without burdening them with administrative responsibilities.

The Prime Minister, he went on, had placed great emphasis on the potential use to which laboratories should be geared in the years to come. There was a legitimate question in the minds of people as to the kind of work to which they should be put to. The nation was looking for an answer from them. He recounted the experience of working in his constituency in a scheme of integrated rural development for display of solar stills and other scientific practices in the rural areas. Large sections of people had to be educated in the use of new machines, gadgets, etc. There was thus a need for dissemination of knowledge of science and the relevance of work done in remote laboratories. This was a specific work for the laboratories. There was an immense pool of talent available and this should be made use of for educating the people in scientific practices. There could be schemes for additional education or training so that the undifferentiated mass of S&T knowledge could be directed specifically to urgent needs in selected sectors. The question was how to build on the general pool. This should be done with the cooperation of other departments. Scientists were intellectuals and like all intellectuals they were individualistic but scientific research was the most cooperative endeavour and so if they could interact with the other departments this could result in experience adding to other people's experiences.

The following presentations were made at the conference: National standards of measurement and calibration services (Dr Kailash Chandra, NPL), Library of standard materials (Dr Krishan Lal, NPL), Industrial Electronics for transportation (Dr G.N. Acharya, CEERI), National mission on drinking water—CSIR contribution (Dr. R.K. Iyengar and Prof. M.M. Taqui Khan, CSMCRI), Optical systems for Space and Defence (Dr J. Prasad and Dr S.R. Gowariker, CSIO), Physics of the earthquake processes—seismic hazard

evaluation and earthquake prediction research in NE India (Prof. V.K. Gaur, NGRI), Oceanography of the Exclusive Economic Zone of India (Dr H.N. Siddiquie, NIO), Safety in chemical plants (Dr G. Thyagarajan, CLRI), Polymer science (Dr R.A. Mashelkar, NCL), Control of parasitic diseases: vaccines and targeted drugs (Dr M.M. Dhar, CDRI), Indian toxicology programme (Dr P.K. Ray, ITRC), Optical fibres for communication (Dr P. Saha, CGCRI), Coal beneficiation (Dr R. Haque, CFRI), and Low cost alternative building material and components (Dr R.K. Bhandari, CBRI),

The conference also discussed in parallel sessions: guidelines for implementing recommendations of the Fourth Pay Commission (Chairman : Dr L.K. Doraiswamy), Training programmes in CSIR (Chairman : Dr Ram K. Iyengar), Recommendations of the conference of Accounts Officers (Chairman : Shri M.V. Ramakrishnan).

It was decided that the next meeting of the Directors would be held from 6 to 8 April 1987 at Hyderabad. □

NIO surveys New Mandovi Bridge site

The National Institute of Oceanography, Goa, at the request of the Government of Goa, Daman & Diu, has completed sub-soil exploration across the Mandovi river at the proposed New Mandovi Bridge site, 60 m upstream of the old bridge by using a number of sophisticated electronic equipment. The institute had earlier carried out a number of similar seabed surveys for gas/oil and effluent discharge pipelines and ports and harbours for different organizations throughout the country.

The present investigations consisted of bathymetric survey to provide information on depth of water, side scan sonar survey to locate potential obsta-

cles, the nature of the sediments and their extent on the riverbed and sub-bottom profiler (mud penetrator and boomer) to provide information on the total overburden thickness and depth to bedrock. The positions were obtained by radio positioning system with an accuracy of + 3 m.

A preliminary study of the survey records revealed that the maximum depth in the central part of the channel is about 7.5 m below chart datum and that the riverbed is covered in general by mud and a few sand patches. Sandy clay/clay with lenses is also present beneath the river bed and the depth to bedrock varies from 15 to 20 m below the riverbed in the channel. A preliminary report of the above surveys has already been submitted to the government.

This kind of integrated surveys gives continuous data in an accurate and rapid manner, useful for the construction of a bridge besides reducing the number of bore holes to a bare minimum. □

Superior tetraploid strain of Egyptian henbaneh evolved at CIMAP

Hyoscyamus muticus (Egyptian henbane) is one of the most important medicinal herbs produced in Egypt. It is a valuable source of tropane alkaloids, chiefly hyoscyamine, which find diversified uses in medicine due to their anticholinergic action. Also, the crude drug obtained from this plant provides relief from painful spasmodic condition of the non-striated muscles, irritation of hysteria and irritable cough.

This important medicinal plant was first introduced in India during 1977 by the Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow, from Egypt. It was found to do exceedingly well under subtropical and tropical regimes of the country. However, the available commercial stocks suffer from low alkaloid content and less biomass yield. Therefore, efforts were made at CIMAP with a view to improving its economic viability. The available lines were sub-

jeeted to polyploidy breeding. Such a proposition was found to be even more desirable since the economic product is its biomass, possessing the alkaloid content, and induced polyploidy is known to improve the vigour (gigantism) substantially, hence the total dry matter production.

As a consequence of concerted efforts and repeated selections over generations in the induced polyploid progenies, a highly desirable autotetraploid strain (CIMAP/HMT-1) was isolated and thoroughly tested under diverse trials. The performance data, taken on two consecutive harvests spread over nearly 200 days, exhibited the genetic superiority of the autotetraploid to the order of 37.5% on

alkaloid yield basis over the diploid, thus evincing significant improvement of this crop through polyploidy approach. The tetraploid possesses the potential of producing 645.0q fresh herbage, 43.2q dry matter and 45.4 kg crude alkaloid per hectare, compared to 511.0q, 37.7q and 33.0 kg present in the diploid, respectively. The range of the average alkaloid content in the dry matter varies from 0.89% to 1.26% in the tetraploid (overall average 1.05%) and 0.7% to 1.1% in the diploid (overall average 0.87%), over the two harvests. This is mainly because the second harvest yields more alkaloid in the dry matter due to the reduced amount of woody portion in the herbage.

One of the unique features of this

autotetraploid is its high seed fertility, which is quite uncommon in artificially induced autotetraploids. This would prove to be a premium for its wide cultivation as the crop is basically seed propagated. Moreover, good seed fertility might also help to maintain its genetic stability and reproductive potential. This is one of the few cases hitherto known in seed propagated crop species in general, and first of its kind in medicinal plant species in particular, where such a genetically stable and highly fertile autotetraploid has been produced and commercially tested in field scale trials. Thus, the newly evolved genetically superior tetraploid strain (CIMAP/HMT-1) is likely to boost the commercial cultivation of Egyptian henbane in India significantly.



Tetraploid strain of Egyptian henbane (CIMAP/HMT-1) developed by CIMAP, Lucknow

Second β naphthol plant based on CFRI know-how commissioned

A plant for the production of β naphthol from naphthalene by Central Fuel Research Institute, Dhanbad's developed process has been successfully commercialized by the Oswali Chemicals Limited, Cuddalore, Tamil Nadu, in September 1986. The β -naphthol plant, second of its kind in India based on the indigenous know-how has a capacity of 1000 tonnes/annum and the product is of purest variety conforming to standard specifications. β -Naphthol is an industrial intermediate for the manufacture of dyesuffs.

The first plant based on CFRI know-how, having a capacity of 660 tonnes/annum, was commissioned in October 1981 at Bokaro Industrial Area, Dhanbad, by the Eastern Naphtha Chem. Limited. Reportedly, this plant is producing (purity more than 99.5%) 30% more than its rated capacity.

National Research and Development Corporation was entrusted with the responsibility for commissioning the plant and the team was led by one of the inventor/scientist from CFRI, Dr Subodh Kumar Roy. □

Utilization of foot oil obtained during the manufacture of paraffin wax

There are about 70 registered units in Bihar engaged in the manufacture of paraffin wax by hot pressing or sweetening process. During the manufacture of paraffin wax 35-40% of foot oil is obtained, which is nothing but a mixture of lube oil and wax. Further deoiling of foot oil into its constituents in small scale unit is a typical Indian problem as such units do not exist in other parts of the world. The economic viability of the small scale wax refiners is very much affected due to poor returns through the sale of waste foot oil. The existing process only permits them to use Brauni slack wax.

Through the Polytechnology Transfer Centre (PTC), Patna, a developmental project funded by the Department of Industry was sponsored at the Indian Institute of Technology (IIT), Bombay, to develop a process which could be adopted in small scale sector for separating the constituents of foot oil. This would enhance the economic viability of the wax refiners considerably.

IIT, Bombay, successfully developed a process which was exposed to wax refiners in the state, in a workshop held at Patna on 29 May 1986. The workshop was jointly arranged by the Bihar Wax Refiners Association, Department of Industry, Government of Bihar and PTC, Patna.

The urea adduct dewaxing process developed for SSI units is different from the processes described in literature. The major difference being that the use of organic solvent diluent has been completely eliminated and this has made its adoption possible in SSI units. This development has also opened a new avenue to utilize high oil slack wax available from Haldia and Madras Refineries, which otherwise was not possible in the existing process.

A number of parties have shown interest in commercially exploiting this know-how. □

PTC- Patna's efforts towards improving the efficiency of cold storage units in Bihar

Cold storage is a well established industry in the state of Bihar. There are more than 250 cold storage units in Bihar involving an investment of more than 1000 million.

Deteriorating physical condition and performance of cold storage units in the state has been a matter of great anxiety and concern to the owners, the government and the users. Through the Polytechnology Transfer Centre (PTC), Patna, Government of Bihar, sponsored a project at the Central Mechanical Engineering Research Institute (CMERI), Durgapur, for carrying out the investigations into the causes that have led to such a situation. The major problems for poor performance of these units relate to: structural designs and insulation, operational and maintenance deficiency, wrong loading and unloading practices, and poor technical skill of personnel. Remedial measures related to the above mentioned aspects have been suggested which would considerably improve the efficiency of cold stores. Efforts are being made so that the expertise available at CMERI is utilized by the existing cold storage units. □

NEERI to assist ten Indian states under the Water Technology Mission

The National Environmental Engineering Research Institute (NEERI), Nagpur, will provide its R & D know-how to ten districts in the country under the Technology Mission on Drinking Water in villages. This was disclosed by Shri K.R. Bulusu, Acting Director, NEERI, in the opening session of a two-day Technology Awareness Programme held at NEERI, on 25 August 1986. The programme was attended by about 20 chief/ executive engineers from ten states in India. The problem districts which are to be covered under the programme are: Barmer (Raj-

asthan), Kutch (Gujarat), Jhabua (Madhya Pradesh), Kumool (Andhra Pradesh), Gulburga (Karnataka), Ramanathapuram (Tamil Nadu), Gurgaon (Haryana), Mirzapur (U.P.), Bankura (West Bengal) and Khasi (Meghalaya).

According to Shri Bulusu, there are about 1400 villages in each problem district. As a first step, NEERI would evaluate water quality in these villages and provide the design of suitable water treatment plants based on the know-how available with the institute. Several technologies have been developed by NEERI and are in use in various parts of India to solve water quality problems. NEERI know-how include Nalgonda technique of defluoridation and slow sand filtration, desalination, disinfection and iron removal techniques.

Dr R. Sarin, Head, Basic Research & Training Division, NEERI, mentioned that the five institutes that would be participating in the Ministry of Rural Development sponsored programme are: NEERI; Central Salt & Marine Chemicals Research Institute, Bhavnagar; Bhabha Atomic Research Centre, Bombay; National Geophysical Research Institute, Hyderabad and the Defence Laboratory at Jodhpur.

Shri R. Paramasivam, NEERI's National Coordinator for the Water Technology Mission, outlined how the programme would be implemented and urged all states to provide all the available data on water quality with regard to the problem districts. □

IIP-IFP process on hydrogenation of pyrolysis gasoline and C₆ cut released to Haldia Petrochemicals

An agreement has been signed between the Indian Institute of Petroleum (IIP), Dehra Dun, French Institute of Petroleum (IFP), France, and the Haldia Petrochemicals Ltd, for the release of IIP-IFP process on 'Hydrogenation of pyrolysis gasoline and C₆ cut'. Under this agreement IIP and IFP will jointly prepare the process design package and guarantee the successful completion of performance tests.



Pyrolysis gasoline hydrogenation plant of IPCL based on the process developed by IIP-IFP

This process is for improving the stability of byproduct pyrolysis distillates from naphtha cracker by selectively hydrogenating the diolefins and alkenyl compounds in first stage and the olefins and hydrodesulphurization of c_6 fraction to obtain a product suitable for benzene extraction.

This IIP-IFP process is a leading process in the world and has already been under successful operation at the Indian Petrochemicals Ltd, Vadodara, since 1978.

Shri S. Patil, Engineer, IIP, is being deputed to IFP for preparing the process design package as per an internal agreement between IIP and IFP: □

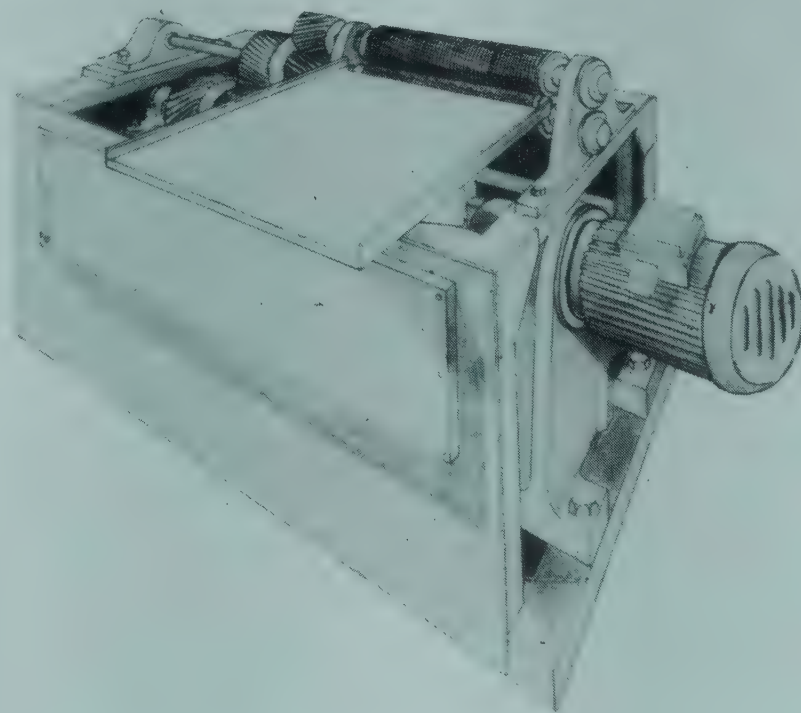
Paper shredding machine with cross-cut cutter

Depending upon the requirements and needs of the individual organization, different methods and means are adopted for destruction of papers. For example, banks use incinerators to burn soiled currency notes thus inviting the risks of part burning of the bundles or their get-

ting stick in the chute on way to incinerators. Similarly Defence establishments, examinations conducting bodies and various other organizations follow different procedures to destroy their documents. Unfortunately however, methods

in vogue add to the municipal problems such as atmospheric pollutants like sulphur based toxic gases that are produced from burning currency notes. In order to meet the strict requirements of Municipal Corporation of Bombay, the Reserve Bank of India, approached MERADO with their requirements for a machine which could mechanically destroy their notes to the smallest bit possible, thereby avoiding the use of incinerators and emission of toxic gas to the open atmosphere. Market survey was conducted and it was found that machines for straight cuts were available in the market, thus leaving the scope of improper destruction of notes to the first bit. The Mechanical Engineering Research and Development Organization, Pune, has designed and fabricated prototype of a paper shredding machine which can cross-cut the paper.

The machine is capable of destructing the soiled notes in 11mm thick bundles in 4x4 mm cross-cut bits which are fit to be used as packing materials or even reprocessed for paper production. The prototype is powered with a 7.5 kw



Paper shredding machine developed by MERADO, Pune

geared motor to transmit power to rotary gauge cutter made of cold working tool steel. Forty-three cutters are mounted on the upper shaft followed by forty-two helical cutters on the lower shaft. They are suitably spaced by the spacers. To facilitate cross cutting, cutters have helical grooves in sequential manner and shredding is done through rotary shear process. Paper material is fed manually to the front of cutters over a table and the shredded bits are collected from behind in a chute. Finger assembly is mounted on the main frame to remove the shredded pieces from the cutters and spacers to drop into the chute automatically.

The machine is rugged and highly efficient. A safety roller is also provided to protect the worker from pushing his hand into the cutters while feeding the material. Salient specifications of the machine are:

Weight of prototype	: 1000 kg
Size of prototype	: 2500x1000x1200 mm
Power	: 7.5 kw
Cutting width	: 200 mm
Speed	: 670 mm/sec
Maximum thickness of paper	: 11 mm
Working capacity	: 60 kg/hr

The know-how is ready for commercial exploitation. □

Development and demonstration of an appropriate CGCRI technology for low cost ceramic products for rural sanitation, drinking water supply and housing

In line with the objective of the Seventh Five Year Plan for providing rural sanitation, drinking water supply and low cost housing and at the instance of the Council for Advancement of Rural Technology (CART), the Central Glass and Ceramic Research Institute (CGCRI), Calcutta, took up a sponsored project in September 1985, with a view to developing an 'appropriate technology' for pro-

duction of the following low cost ceramic items: Rural sanitaryware (rural pan, trap and foot rests), Ceramic building components, viz. unglazed flooring and facing tiles for low cost housing, and Ceramic water filter candles. The technology developed has several novel features like use of cheaper and locally available raw materials as well as simplified processing techniques. Firing of the wares in energy-efficient LTM kiln makes the products more cost effective. The programme was intended to generate self employment opportunities for rural potters through service-cum-training centres. The technology was transferred to prospective user agencies identified by CART through a demonstration programme' held at CGCRI, Khurja Centre.

Fourteen participants sponsored by the following five agencies from different regions of the country participated in the demonstration programme: Gandhi Smarak Nidhi, Trivandrum; M.P. State Industries Corporation, Gwalior; Gramodyog Sangha, Bhadravati; K.S. Pottery Development Centre (Industries Department, Government of Orissa), Jharsuguda; and Bankura Zilla Parishad, Panchmura, Bankura. The demonstration programme was started on the occasion of inauguration of the CGCRI Khurja Centre [CSIR News, 36(1986), 138].

The four-week programme comprised fifteen lectures and practical demonstrations, covering the following aspects: Raw materials for low cost products and evaluation of green and fired properties of bodies, Design and fabrication of moulds of sanitaryware, Production process for rural sanitaryware, unglazed vitrified flooring tiles, facing tiles, etc., Design and fabrication process of fire-clay based saggars, Setting, loading and firing of wares in LTM kiln, Quality control of products, and Production of ceramic water filter candles.

Shri K.N. Maiti, Scientist-in-Charge of the CGCRI Khurja Centre and Shri S. Chakraborty, Scientist, were the principal investigators of the project. □

Studies on biodegradation of aromatics in multisubstrate environment

Nitro, hydroxy and amino aromatics are some of the substituted benzenes which are generally present in wastewaters from organic chemical industries. Substituted benzenes play a significant role in the manufacture of drugs and pharmaceuticals, dyestuffs, detergents, rubber chemicals, plastics, synthetic fibres, pesticides and other chemicals. Since aromatic nucleus has a larger negative resonance energy and its stability is influenced by the substituents, these compounds show a variable response towards biodegradability when subjected to biological treatment. Acclimated activated sludge, no doubt, possesses requisite enzyme systems to degrade a number of substituted aromatics. However, wastewaters from chemical industries almost invariably constitute a multisubstrate system and their biodegradability is difficult to predict from the knowledge of the biodegradability of a monosubstrate system as there often exists metabolic interaction during mixed substrate utilization by mixed population of microorganisms leading to preferential or sequential substrate utilization in a multisubstrate environment.

With a view to getting an insight into the manifestation of such interaction in biological wastewater treatment, Shri S.D. Deshpande, Scientist B, Recalcitrant Industrial and Hazardous Waste Division, National Environmental Engineering Research Institute (NEERI), Nagpur, initiated experiments with mono- and multisubstrate systems and wastewaters generated from basic organic chemicals manufacturing processes. The researcher inferred from these experiments that oxidizing capability of activated sludge acclimated to mixed feed is typical for batch and continuous systems. In batch systems oxidizing capability of activated sludge largely depends on the substrate(s) to which it is acclimated. For example, when a mixed feed containing *m*-nitrobenzene sulphonate (*m*-NBS) and resorcinol is fed to an activated

sludge previously acclimated to *m*-NBS, *m*-NBS is utilized preferentially. On the other hand, when the same mixed feed is fed to an activated sludge acclimated to both resorcinol and *m*-NBS, these are found to be simultaneously utilized. However, sequential removal of resorcinol followed by *m*-aminophenol (*m*-AP) and sequential removal of catechol followed by resorcinol were observed by the activated sludge acclimated to the respective mixed feed. Utilization of *m*-NBS from *m*-NBS-catechol system was found to be aided by cyclic adenosine monophosphate (*c*-AMP) indicating the possibility of existence of operon like mechanism and ability of *c*-AMP to act on a microbial consortium.

In continuous system, dilution rate was found to have an effect on the substrate utilization pattern. From mixed feed, both resorcinol and *m*-AP were utilized simultaneously when the dilution rates maintained varied between 0.0418 and 0.162/h. At dilution rate of 0.323/h, however, resorcinol was found to be preferentially utilized.

The present investigation on biodegradation of aromatics has provided basic information regarding the biodegradation of some xenobiotics of industrial importance in multi-substrate environment.

Shri Deshpande carried out the work under the guidance of Dr T. Chakrabarti of NEERI and was awarded Ph.D. degree by the Nagpur University in 1986 for his thesis based on the study. □

Analytical methods in organic chemistry

Shri S.Y. Kulkarni of the National Chemical Laboratory, Pune, studied: 1. C-O-C stretching and deformation frequencies of some acetylated glycosides in the region 1100-1000 cm^{-1} and 300 cm^{-1} , respectively for the identification of α - and β -anomers of glycosides; 2. Electron impact and chemical ionization mass spectrometry of some tetra-acetylated glycosides related to (i) identification of anomers of glycosides on the

basis of peak intensities in the EI and CIMS, (ii) structure of $(\text{M}+\text{NH}_4)^+$ ion in the NH_3CI mass spectra, and (iii) comparison of solution and gas phase fragmentation of glycosides; 3. Gas and liquid chromatographic behaviour of acetylated anomeric glycosides including separation of anomeric pairs of glycosides and mobility, structure relationship; 4. ^{13}C NMR, magnetic susceptibility and infrared spectroscopy of diethyldithiocarbamates of a number of metals; 5. Microdetermination of chlorine and metal in Pt Group metal organic compounds, which otherwise interfere in the estimation of chlorine because of the formation of coloured, insoluble metal salts. The micro Carius oxidation procedure was modified and the method was extended to determine metal simultaneously by atomic absorption spectroscopy.

Shri Kulkarni carried out these studies under the guidance of Dr V.S. Pansare and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

Analytical studies of oxidants for catalytic oxidation of organic compounds

Shri S.S. Ramdasi of the National Chemical Laboratory, Pune, has developed a novel method to determine the relative activities of sample-additive reagents as oxidants for promoting smooth combustion of not easily combustible compounds used in organic elemental analysis. The method is based on partial oxidation of a test-compound under carefully controlled conditions using various sample additives in an atmosphere of oxygen. Behaviour of five structurally different organic test-compounds, i.e. acetanilide, phenanthrene, 8-hydroxyquinoline, 1-octadecyl alcohol and cholesterol, was studied under these conditions. Acetanilide was recommended as

the best test-compound due to its combustion characteristics.

DTA/TG studies of these oxidants furnished data regarding oxygen availability. Other parameters of these catalysts, e.g. mean particle size, by scanning electron microscopy and surface area measurement were also determined. The surface properties of mixed oxides showing high activities, e.g. t.d.p., AgMnO_4 , (MnO_2+Ag) , (MnO_2+Cu) and (MnO_2+Co) , were studied using ESCA.

Kinetic studies of combustion of phenanthrene were carried out on microscale at 300°C with ten sample-additive reagents. The rate of this pseudo first order reaction was studied by estimating carbon dioxide obtained after combustion of the oxidation products formed at fixed time intervals. Equations for the best straight line plots showing the relationship between the sample combusted and time were found out by the method of least squares. The activities of the sample additive reagents showed a general correlation with intercepts of the best straight lines on Y-axis.

Catalytic vapour-phase oxidation of four aliphatic alcohols, 1-butanol, 1-hexanol, 1-octanol, 1-decanol, was carried out on V_2O_5 supported on SiC (10% w/w) at 250°, 300° and 350°C in a semi-microreactor with a view to studying the extent of formation of the corresponding aldehydes. The oxidation products were analyzed by GC. In addition to the expected aldehyde and a small quantity of acid, some unidentified product was also obtained in each case and its nature was determined using GC-MS. It was observed that the conversion of alcohol to aldehyde per pass was excellent (90%) in 1-butanol and reasonably good (70%) in 1-hexanol. However, it was rather low (40%) in 1-octanol and 1-decanol due to the formation of the undesirable products in higher proportions.

Shri Ramdasi was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. He worked under the guidance of Dr V.S. Pansare. □

PROGRESS REPORTS

RRL-Jammu Annual Report: 1985-86

The annual report of the Regional Research Laboratory (RRL), Jammu, for 1985-86 presents the R&D activities of the laboratory, projectwise, in the following disciplines: Drugs and pharmaceuticals; Natural products (cultivation, processing and chemistry); Biotechnology; Speciality coatings, binders and allied resins/polymers; Post harvest technology of agro horticultural produce; Edible mushrooms; Utilization of mineral resources of north west India; Development of backward areas; Applied biology; Processing of sheep, goat and fur skins; and Non-conventional sources of energy.

The laboratory pursued one sponsored job and eleven consultancy assignments. It designed, fabricated and commissioned a turnkey plant for the fractionation of Java citronella having a capacity of 15,000 litre/annum, at the Telipara (New Jalpaigudi) drug farm of the West Bengal Pharmaceutical & Phytochemical Development Corporation Ltd. A pine needle board plant for the Himachal Pradesh State Fruit Packing Co. Ltd was designed, fabricated and installed at Baijnath (H.P.). This plant was formally inaugurated by Shri Vir Bhadra Singh, Chief Minister of Himachal Pradesh on 26 April 1985 and is under regular production since then. A continuous fractionating column having reboiler capacity of 250 litres/hr was designed and fabricated. The packed length of the column is 8.4m and it has provision for continuously supplying the feed and simultaneously withdrawing the product without disturbing the column equilibrium. This column operates under vacuum.

A turpentine fractionating column, for ITR, Bareilly, based on the laboratory engineering design was successfully commissioned in November 1985. This plant can process 12 lakh litres of tur-

pentine oil per annum to produce high purity α -pinene, β -pinene, Δ^2 -carene and longifolene valued at Rs 12.5 million.

The first phase of the phytochemical factory of the Malabar Phytochemicals Ltd at Nilambur (Kerala), consisting of essential oil unit was successfully commissioned in January 1986 and it has since started production of geraniol, citronellal and ionones. A comprehensive project report covering process details, engineering drawings, cost estimates, addresses of fabricators and suppliers of machinery was provided to the Deep Chemicals for setting up plant for the manufacture of boric acid at Bhopal.

Different extracts of *Phyllanthus niruri* were tested for anti-hepatotoxic activity. The aqueous extract showed the maximum activity. On the basis of biological activity and chemical constitution, three chemotypes of *P. niruri* were confirmed. *Picrorhiza kurroa* was found to be a potent immunostimulant, stimulating both the cell mediated and humoral immunity.

For a meaningful genetic manipulation of the intending industrial microorganism, a suitable facility was created during the year. Scientists from various allied disciplines were redeployed and adequately trained to work on recombinant DNA technology. Studies were being made on steroid biotransformation and hydrocarbon fermentation.

On the basis of field surveys and study of geographical and seasonal variability in the yield of oil and its physico-chemical properties it was found that *Juniperus macropoda* leaves yield 1.5 to 2.7% oil (on semi dry basis), which has cedrol (around 25%), sabinene, limonene, methylheptenone, terpineol, caryophyllene and cadinols. The trees are mostly found in the Pattan and Keylong valleys of Lahaul and Chatru and Kaza tract of Spiti.

Enriched alpha-acid hop extract with 50% alpha acids and 17.6% beta acids was produced on bench scale. This extract has alpha acids 13% higher than the 'extra grade' available in the world

market and 20% higher than the hop extract imported in India.

A process was developed for the separation of hard and soft waxes from press mud (a sugar factory waste obtained by double sulphitation process) and isolation of sterols, fatty alcohols and fatty acids from soft wax by saponification followed by solvent partition technique.

The free fatty acid content of commercial rice bran oil could be reduced from 40% to about 8% with the help of an ion-exchange resin as catalyst at temperature as low as 110°C.

Using fusion or advancement process, epoxy resin with about 2500 WPE has been prepared for use as base component in structural mouldings, castings and high temperature adhesives. Some curing agents for epoxy resins were also evaluated, which could be used for a range of desired characteristics. A number of esters have been prepared from maleinized resin and epoxy resins with very low acid values (2-8) but appreciably high softening points (120-135). These are vastly superior in all characteristics than the conventional resin esters.

Sodium borohydride had already been successfully prepared on a very small scale (about 10g). For the preparation of this compound on a large scale, first methyl borate and sodium hydride are prepared separately and with interaction of these two compounds sodium borohydride is prepared. The major difficulty is that in preparation of methyl borate the yield is only 15-20%. After a lot of trial runs by different routes, the yield was increased to 50%. Trials were being continued to increase the yield still further.

Two microprocessor controlled spectrophotometers (UV-VIS & IR) and computer controlled dichrograph were installed during the year. An extraction unit (capacity 200 kg of drug/batch) was designed and fabricated in the laboratory. The salient features of this plant are efficient mass transfer through agitation and nominal solvent losses.

One thousand two hundred thirty cuttings of the two aroma hops genotypes

Jubilee and Soma 433 evolved at RRL (Branch), Srinagar, and approved by the All India Brewers Association were released to a few selected growers for trial cultivation. Also, 355 cuttings of Har-mukh RRL (H 17 x 63-8), a high yielding genotype, were released to these parties.

Three books: *RRL-Jammu Silver Jubilee Commemorative Lectures*, *Ergot Production in India* and *Hops in India* were published. A book entitled *Weed Flora of Kashmir Valley* was written by a scientist of RRL (Branch), Srinagar, and published during the year by a private publisher.

Twenty-five papers were presented in symposia/seminars and 72 papers were published. □

NEW PUBLICATIONS

CMRS Annual Review: 1985-86

The Central Mining Research Station (CMRS), Dhanbad, has brought out the title publication as an adjunct to its annual report, to convey a brief overview of the R&D activities of the laboratory carried out during 1985-86, in the field of Geomechanics and Mining Methods, Mine-Environment, Miner's Health as well as Mine Engineering Design & Development and Instrumentation. The publication shows that major portion of the R&D work carried out during the year was under sponsored, consultancy and grants-in-aid projects; the number of such projects increasing year after year.

The publication is mainly meant for the mining engineers, planners and policy makers.

Enquiries pertaining to the publication may be addressed to the Director, CMRS, Dhanbad 826 001. □

Proceedings of National Seminar on Electronics in the Pulp and Paper Industry

The Central Electronics Engineering Research Institute's Madras Centre has brought out the proceedings of the national seminar on Electronics in the Pulp and Paper Industry, organized by

the Centre and the Department of Electronics, at Madras on 21-22 December 1984.

The proceedings project the important themes under six major headings covered in the technical sessions of the seminar. These are: Trends in dry end instrumentation; Trends in wet end instrumentation; Trends in process instrumentation; Data systems for process applications; Trends in mill control techniques and Panel discussion featuring need for instrumentation in the Indian pulp and paper industry.

The text of speeches delivered at the inaugural session, and the complete deliberations including the 23 technical papers presented are covered in the publication.

Enquiries pertaining to the publication (edited by Dr P.E. Sankaranarayanan, demy 4 to, pp 296 +X) should be directed to: The Scientist-in-Charge, CEERI Extension Centre, CSIR Madras Complex, Taramani, Madras 600113. □

DEPUTATION BRIEFS

Dr. N. Chandrakumar

Dr N. Chandrakumar of the Central Leather Research Institute (CLRI), Madras, was invited to JEOL (Tokyo) and NIH (Bethesda, USA), to give seminars on his recent research work and to carry out research in related areas of NMR. He spent about ten weeks at the Biometrology Laboratory, JEOL and about five weeks at the Laboratory of Chemical Physics, NIH.

During his stay in Japan, Dr Chandrakumar extended his earlier work on isotropic mixing both theoretically and experimentally, invented a new experiment for heteronuclear correlation spectroscopy, and collaborated with Dr. Nagayama of JEOL in applying symmetrization to produce pure phase signals in certain classes of two-dimensional spectra.

In US, Dr Chandrakumar collaborated with the research group of Dr A. Bax and Dr E.D. Becker, exploring new NMR pulse sequences for hetero-nuclear correlation of both directly bonded and

remote-coupled nuclei. He also completed correction of the page proofs of the book *Modern Techniques in High Resolution FT-NMR* by N. Chandrakumar and S. Subramanian, being published by Springer-Verlag, New York.

On his way home, Dr Chandrakumar was invited by Bruker-Spectrospin to look at their latest magnetic resonance instrumentation in Switzerland and Germany. He was also invited to ETH, Zurich, where he had extended discussions with the research group of Prof. R.R. Ernst, and to the Universite' de Lausanne, where he gave a seminar to the group of Prof. G.Bodenhausen. □

PERSONNEL NEWS

Appointments/Promotions

Dr G.R. Venkitakrishnan

Dr G.R. Venkitakrishnan, Scientist F, and Head, Process Development Division, National Chemical Laboratory, Pune, has been promoted as Scientist G with effect from 1 Jan. 1983.

A Ph.D. in Chemical engineering from the Indian Institute of Science, Bangalore, Dr Venkitakrishnan has been with NCL since 1966. Engaged in process development and process design work of which division he now heads Dr Venkitakrishnan has played a major role in the successful implementation of several of the NCL's major technologies. He has visited on deputation, Europe including UK, USA and Japan in connection with NCL's projects and also for discussions on research programmes in selected universities in USA.

At the Indian National Scientific Documentation Centre, New Delhi, the following have been promoted on assessment with effect from the dates given in parentheses:

As Documentation Officer EII

Shri T.N. Rajan (1 March 1981), and Shri A.S. Raizada (1 Aug. 1981) (expired on 7 Nov. 1983).

As Reprography Officer EII

Shri K.S. Nagarajan (1 Sep. 1982)

As Documentation Officer EI

Smt. Kamala Boppana Rao, Shri Dinesh

Elhence, Shri R.C. Ardey, Smt. J.K. Ahluwalia, Shri S.I. Islam (all the five from 1 Feb. 1981), Shri D.N. Gupta and Shri O.N. Chadha (both from 1 April 1981).

As Translation Officer EI

Shri C.M. Ramani (1 Feb. 1981) and Shri P.D. Prashada Rao (20 June 1981).

As Programmer C

Shri Ravinder Ojha (21 July 1982) (expired on 8 May 1984).

Honours & Awards

Dr T.N. Khoshoo gets Sanjay Gandhi Award in Science & Technology

Dr T.N. Khoshoo, Distinguished Scientist, Council of Scientific and Industrial Research, has been awarded the prestigious Sanjay Gandhi Award for 1984-85 in the field of Environment and Ecology. The award was given by Shri P.V. Narasimha Rao, Minister for Human Resources Development and Health, on 12 November 1986. Dr Khoshoo is a former Director of the National Botanical Research Institute (NBRI), Lucknow, and former Secretary, of the Department of Environment.

The Sanjay Gandhi Award for Science and Technology was instituted by Sanjay Gandhi Memorial Trust to promote and encourage scientific effort in the following fields: Environment and Ecology; Energy; and Family Welfare and Population Control. The award carries a cash prize of Rs one lakh and a citation.

Dr Khoshoo has contributed materially to our understanding of plant sciences especially in relation to aspects connected with environment and energy. His work on conservation, based on genetic-evolutionary architecture and improvement of forest trees, ornamentals, and non-agricultural wild economic plants is outstanding.

Dr Khoshoo's pioneering work on forest trees enabled him to suggest breeding strategies for their improvement, in a manner that would give long-range ecological security under changing environmental conditions. This approach confers both immediate environmental fitness, as also long-term flexibil-

ity to the forest tree populations. In essence, it involves maintenance of a high degree of genetic diversity in the forest tree populations, thereby simulating organic evolution and ensuring survival under changing environmental conditions.

He established the country's first Biomass Research Station utilizing *usar* land for raising short-rotation high-density biomass for fuel, fodder, food, fertilizer and routine medicare. These are the chief plant-based activities in a village system. This has helped in evolving strategies for the utilization of *usar* land on a holistic basis as woodland, cropland and grassland. The identification of species for diverse purposes that grow in such inhospitable, habitats has been possible.

His work on conservation of biological diversity is based on the rationale that, in the ultimate analysis, production, involving genetic-evolutionary considerations, is the best form of conservation. Following this approach, it has become possible to save high-value herbal drug plant species, at present endangered on account of excessive collection from the wild habitats.

Dr Khoshoo has provided leadership over a wide range of environmental areas, and has been responsible for initiating a number of All-India Coordinated Projects on research and development education and training, and demonstration and extension. It has been possible to identify pollution tolerant and resistant plants for landscaping polluted areas; and reclamation and utilization of sewage for fuel, fertilizer, feed and irrigation through an integrated approach. Furthermore, the project on ethnobiology has brought to fore the traditional wisdom regarding wild plants used by tribal and such populations for diverse purposes.

Km. T.K. Varalakshmi

Km. T.K. Varalakshmi, Senior Personal Assistant, Central Leather Research Institute, Madras, was selected to represent India in the Tenth Asian Games held

during September-October 1986 at Seoul, South Korea, in the Sport Pistol event. From 1972 onwards, Km. Varalakshmi has been participating in almost all the state and national meets, winning first/second positions a number of times. In the nationals in 1985, she took the Silver in the team event of Sport Pistol.

Shri Y. Nageswara Rao

Shri Y. Nageswara Rao, Scientist, Regional Research Laboratory, Hyderabad, was selected to represent the country in the World Bridge Tournament held at Miami, Florida, USA, in September, 1986. Shri Rao has been participating in bridge tournaments both at the state and national levels for a number of years and has been a member of the winning team on several occasions. □

PATENTS FILED

603/DEL/86 : Recovery of fertilizer grade potassium values and production of pure silica from biotite mica, Dr (Km) Chandrika Varadachari—University College of Agriculture, Calcutta University, Calcutta.

604/DEL/86 : Production of fertilizer grade potassium values and simultaneous recovery of alumino-silica values from nuecovita mica, Dr (Km) Chandrika Varadachari—University College of Agriculture, Calcutta University, Calcutta.

371/DEL/86 : A process for the recovery of copper, nickel and cobalt from converter slag or any other oxidic sources, B.K. Satapathy, P.S. Dutta, D.N. Dey & P.K. Jena—Regional Research Laboratory, Bhubaneswar.

292/DEL/86 : A process for the preparation of collagen derivatives from projected and poor quality hides and skins useful for incorporation in cosmetic formulations, T.S. Ranganathan, M.D. Ranganayari & K.S. Jayaraman—Central Leather Research Institute, Madras. □

CSIR NEWS



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Smt. Mobsina Kidwai delivering her inaugural address at the National Get-together on Road Research and Its Utilization. Others seen on the dais (from left) are : Dr M.P. Dhir, Director, CRRI; Shri R.T. Atre, President, Indian Roads Congress; Dr A.P. Mitra, Director General, CSIR; Shri P.P. Nayyar, Secretary, Department of Surface Transport; and Prof. S.R. Mehra, Ex-Director, CRRI

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NGRI celebrates its twenty-fifth Foundation Day

The National Geophysical Research Institute (NGRI), Hyderabad, which was established in 1961, celebrated its twenty-fifth Foundation Day on 11 October 1986. Prof. C.N.R. Rao, Director, Indian Institute of Science, Bangalore and Chairman Science Advisory Committee to the Prime Minister, delivered the Foundation Day lecture on 'Being a Scientist in India'. Pleading with the scientific community to develop a culture of 'live and let live' Prof. Rao emphasized in his lecture the importance of establishing healthy traditions for the progress of science in India. He said that the present day facilities for scientific research in the country were good and governmental investment in science and technology was substantial. Despite this the returns were not commensurate with the investment and first rate scientific research output was low. "Looking at the problem objectively", Prof. Rao said, "40 to 50% of the work in the research laboratories was of repeti-

tive nature and could be discarded". Commenting that the strange thing about Indian science is that scientists seem to be satisfied with mediocrity under whose garb many manage to survive, he urged the scientists to take up areas unidentified by others and achieve excellence in those fields. Citing the example of Ramanujan and Raman who produced works of the highest order under very primitive conditions, he exhorted the scientists to have personal commitment to science and scientific research, without which no first rate work could be turned out.

Prof. Rao also laid the foundation stone for a building which is to house the computer centre in the NGRI campus. An amount of Rs 30 million out of a Rs 60 million grant by the Oil Industry Development Board is to be utilized for obtaining a mainframe computing system with necessary peripherals to augment the software development programmes for

processing geophysical data in general and seismic data in particular for oil exploration.

As part of the societal mission on drinking water, NGRI has embarked on a programme of extensive investigations for groundwater in different parts of the country. This major activity would be carried out in active collaboration with other organizations, state and central, in about 40 districts, in the first phase of which 10 districts would be covered. A workshop on 'Technology Mission for Drinking Water: Tasks & Strategies' was also organized in which 40 participants from various agencies participated.

A function was held in the evening to felicitate Dr Hari Narain, former Director, NGRI, Dr Amalendu Roy and other retired staff. Dr N. Bhanuprasad, Vice President, Andhra Pradesh State Council for Science & Technology and former Chairman, ONGC, presided over the function. Prof. V.K. Gaur, Director, NGRI, highlighted the accomplishments made by the institute and the course of its future endeavours. Dr Bhanuprasad reminisced about his association with NGRI and complimented the institute on its research endeavours towards assisting the oil exploration programme in the country. □



Prof. V.K. Gaur, Director, NGRI, welcoming Prof. C.N.R. Rao to deliver the NGRI Foundation Day Lecture

National Get-together on Road Research and Its Utilization

The Central Road Research Institute (CRRI), New Delhi, organized a National Get-together on Road Research and its Utilization during 22-24 October 1986 at New Delhi. The main objective of this get-together was to provide a forum where road researchers and users could interact intensively for identification of priority R&D needs, and for coordination and integration of R&D effort at various centres. The get-together was inaugurated by Smt. Mohsina Kidwai, the then Union Minister of Transport, and was

also addressed by Dr A.P. Mitra, Director General, CSIR, Shri P.P. Nayyar, Secretary, Department of Surface Transport and Chairman, Research Advisory Council of CRRRI and Shri R.T. Atre, President, Indian Roads Congress. There were over 200 participants drawn from all over the country, representing road laboratories, academic institutions, user departments, consultancy organizations, highway business interests, etc.

The three-day get-together comprised : a plenary session on organization of road research in the country, and the prevailing constraints with regard to manpower and infrastructure ; A plenary session on identification of outstanding research needs of high priority and ways and means of promoting utilization of results of road research; Intensive group discussions on eight speciality themes covering the broad spectrum : Soil stabilization and rural roads, geotechnical engineering, rigid pavements, flexible pavements, bridges, traffic engineering and transportation planning (including environment and traffic safety aspects), pavement management and investment policies and special projects (surface characteristics, instrumentation, computer applications and documentation). A session on measures for improving road safety ; Presentations on a new major project on road research, viz. pavement performance study ; Presentations on improved rolling equipment and on nuclear instrumentation for measurement and control of moisture/bitumen content and density in the field ; and A concluding session in which sessional reports were read and deliberations held on various aspects.

The get-together emphasized the need for stepping up investment on road research so that it is commensurate with the large variety of problems to be tackled. It also called for developing a comprehensive mechanism for evaluation of results of research and for ensuring their utilization. It recommended that the improved technology should be made available in as 'ready-to-use' a form as possible.

In the area of traffic and transportation, the get-together observed that increased attention was required to be paid to transportation planning in medium and small towns and to road safety. Considering the landslide-prone slopes in the Himalayas, hazard-zonation mapping should be undertaken and R&D efforts should be stepped up on the use of the various ground improvement techniques (geo-textiles, lime piles, stone columns, horizontal and vertical drains, etc.). In the area of bridge and road structures, research should be intensified on the durability of these structures. Available knowledge and experiences should be synthesized on foot-bridges and other types of bridges for far-flung hilly areas.

Soils, low-grade aggregates and industrial wastes should find increased use in road construction. Use of antioxidants, anti-stripping agents and proper grades of bitumen are measures which could lead to improved durability of bituminous constructions. Boundaries of the use of bituminous pavements recycling should be established in techno-economic terms. Cement concrete pavements

should be considered as a good alternative to flexible pavements.

The systems approach to road and pavement management is a very valuable technique in the context of overall transportation efficiency and economy, and should be given high priority for its development and adoption in the country. The maintenance management subsystem needs special attention for assuring proper asset life. There is still considerable scope for improving the serviceability levels of our roads. Easy-to-use objective means are available in the country for expertising necessary checks. Road maintenance should no longer be relegated to the background and level of technology as well as management in this regard should be upgraded.

Smt. Kidwai also inaugurated the operationalization of a new Driver Testing Unit at CRRRI. This unit, imported from Austria, enables a person to be evaluated for certain physiological and psychological aspects under simulated conditions and is considered to be very valuable in studying accident-prone, handicapped or candidate drivers. □



Smt. Mobsina Kidwai inaugurating operationalization of 'act-react system' for driver testing

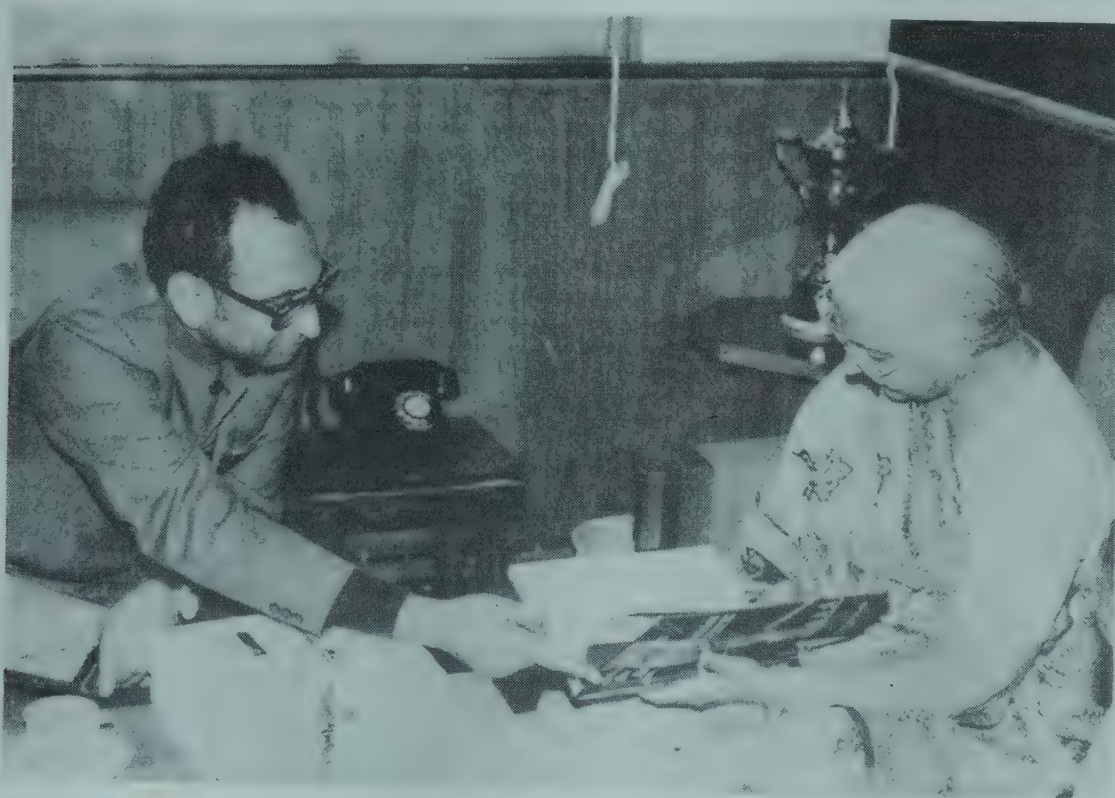
Union Minister for Welfare visits CBRI

Dr Rajendra Kumari Bajpai, Union Minister for Welfare, Government of India, visited the Central Building Research Institute (CBRI), Roorkee, on 16 November 1986. Dr R.K. Bhandari, Director, CBRI, took her round the recently created rural technology park at the institute. The Minister appreciated the buildings constructed with the low cost building materials and techniques developed by the CBRI scientists. During the last few years the institute has developed a number of techniques such as water repellent mud plaster for earthen walls, pre-fabricated low cost roofing units, waste water disposal system and fire retardant thatch roofs particularly for the rural poor.

The institute has also developed a technique for making low cost and high strength bricks that saves 30% energy. About 2500 bricks can be manufactured in one hour using the CBRI process.

Techniques for economical manufacture of good bricks out of kallar soils (saline soils), fly ash and mine wastes have also been developed, sparing the good agricultural land for growing foodgrains, etc. A system of making stone masonry blocks has also been developed wherein the cost of construction of walls can be brought down by 25-30% at places where stones are available in abundance. Such stone masonry blocks have been used in a large number of buildings all over the country on the advice of the institute. Recently, Government of Bhutan made use of such blocks with success in a number of their building construction works.

Dr Bajpai was also shown the models of low cost school buildings, rural houses and townships, etc. developed by the institute. She expressed the hope that the research work going on in the institute will help in the developmental work in rural India which is very much needed. □



Dr Rajendra Kumari Bajpai, Union Minister for Welfare, being explained the R&D activities of CBRI by the institute's Director, Dr R.K. Bhandari

CSIR Exhibition on Wasteland Development

CSIR organized an exhibition on its efforts towards wasteland development, at Vigyan Kendra, New Delhi, on 29 November 1986. The exhibition inaugurated by Dr (Smt) Kamla Chowdhery, Chairman, National Wasteland Development Board, had exhibits in the form of display boards, models, charts and live materials.

Eight CSIR laboratories, viz. National Botanical Research Institute (NBRI) and Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow; Central Salt and Marine Research Institute (CSMCRI), Bhavnagar; Regional Research Laboratories (RRLs) at Jorhat, Bhubaneswar and Jammu; National Institute of Oceanography, Goa and the National Chemical Laboratory, Pune, are involved in active research pertaining to wasteland development which is one of the five national missions identified by the Government of India.

NBRI has done considerable work in the field and has reclaimed huge chunks of land at Banthra and utilized it for paddy cultivation. The laboratory has also reclaimed and utilized *usar* land near Aligarh in UP. RRLs at Jorhat and Jammu and CIMAP at Lucknow have developed plant strains which can be grown on wasteland. Prominent among these are palmarosa, lemongrass, vetiver, lavender, Java citronella and lemongrass. These plants yield oils of great value to perfumery and cosmetic industries. Jojoba plant grown by CSMCRI in coastal wasteland yields lubricating oil for use in machinery.

NCL has developed a superabsorbing polymer called *Jalsbakti*. The polymer has unique capacity to retain water. Bengal gram seedling coated with this polymer bloomed magnificently in drought affected areas; the areas with uncoated seedlings remained completely barren.

The efforts of NBRI, CIMAP and NCL, have yielded dividends in tissue culture research. Tissue culture is an emerging

field with great potential in forestry and agriculture, especially in the micro-propagation of high yielding elite plants, isolation of disease-free and disease-resistant plants and in germplasm preservation. Methods of micropropagation of elites of mature forest trees like teak and eucalyptus spp. have been developed at NCL and NBRI. The elite eucalyptus clones developed are being grown in forests and these have accelerated the afforestation programmes of the state governments.

A press conference was also arranged, which was addressed by Dr Ram K. Iyengar, Additional Director General, CSIR; Dr Kamla Chowdhery; Dr T.N. Khoshoo, Distinguished Scientist, CSIR and Dr N.S. Randhawa, Director General, ICAR. A brochure on *CSIR Agrotechnologies for Wasteland Development*, and related published matter was distributed to the participants. □



Dr (Smt) Kamla Chowdhery, Chairman, National Wasteland Development Board, being shown the CSIR Exhibition on Wasteland Development



Shri Shivraj V. Patil visits NBRI

Shri Shivraj V. Patil, the then Minister of State for Science and Technology and Vice-President, CSIR, visited the National Botanical Research Institute (NBRI), Lucknow, on 3 October 1986. The NBRI Director, Dr P.V. Sane received the Minister and took him round the exposition at NBRI and explained to him the R&D work being carried out under various ongoing projects of the institute. Devoting considerable time at the exposition, Shri Patil evinced keen interest in the research and developmental activities of the institute and made some valuable suggestions. He also visited the Tissue Culture Laboratory and saw the *in vitro* multiplication of various economic plants. Later, he was taken round the botanic gardens of the institute and shown various plant houses.

Shri Patil was very much impressed with the R&D work being done at this premier botanic institute of the country and congratulated the Director and his colleagues for the institute's achievements. □



Shri Shivraj V. Patil (former Vice-President, CSIR) being shown round the exposition by Dr P.V. Sane, Director, NBRI

CDRI celebrates Hindi Day

The Central Drug Research Institute (CDRI), Lucknow, celebrated 'Hindi Day', on 19 September 1986 to instil a mass awakening among the officers and employees for greater use of Hindi in day-to-day official work. On this occasion, Hindi essay and speech competitions were held separately for Hindi speaking and non-Hindi speaking staff. Besides, slogans and quotations encouraging use of Hindi were displayed in both the campuses of the institute. Thirty staff members participated in these competitions. The subjects of Essay and Speech were 'Contribution of Scientific Research in Economic Development of the Country' and 'Use of Atomic Power in Welfare of Human-beings' respectively.

Addressing the prize distribution function organized on this occasion, Dr B.N. Dhawan, Scientist in Director's Grade, CDRI, urged the staff members to ensure maximum use of Hindi in the official work for providing it its due place and strengthening the national unity. □

Microbial transformation of steroids

Microbial transformations are utilized as a general means of preparing important steroid derivatives which are otherwise inaccessible. Shri Sukdeb Bandyopadhyay of the Indian Institute of Chemical Biology (IICB), Calcutta, in his study for obtaining various physiologically important steroid derivatives by microbial transformation, isolated a microbial strain of *Bacillus* species from soil by enrichment culture technique using progesterone as the sole carbon source. Study of metabolism of progesterone with this strain resulted in the formation of two new pregnane analogues, 14-hydroxy-5 α -pregnane-3, 6, 20-trione and 11 α , 14-dihydroxy-4-pregnene-3, 20-dione besides two other rare pregnane derivatives, 14-hydroxy-4-pregnene-3, 20-dione and 11 α hydroxy-5 α pregnane-3, 6, 20-trione. Fermentation of testosterone with this strain produced the meta-

bolites, 4-androstene-3, 17-dione, 17 β -hydroxy-5 α -androstane-3,6-dione, 14-hydroxy-4-androstene-3, 17-dione and 14, 17 β -dihydroxy-4-androstene-3-one. The combination of the types of reactions carried out by the enzyme system generated by the *Bacillus* species is of much interest. It is noteworthy that 14-hydroxy pregnane and androstane derivatives are now receiving attention for their reported dilitalis glucoside-like biological activity.

Metabolism of cortexolone by the same strain of *Bacillus* species was also studied. The five metabolites of cortexolone obtained were characterized as 4-androstene-3, 17-dione; 14-hydroxy-4-androstene-3, 17-dione; 14, 17 α , 21-trihydroxypregn-4-ene-3,20-dione; 6 β , 17 α , 21-trihydroxypregn-4-ene-3, 20-dione and 15 α , 17 α , 21-trihydroxypregn-4-ene-3, 20-dione. The reasonable pathways of formation of these metabolites have been suggested. Although hydroxylation reactions by *Bacillus* species are of common occurrence, this is the first report of the formation of side chain cleavage metabolites by any *Bacillus* species.

Shri Bandyopadhyay carried out these studies under the guidance of Dr S.B. Mahato of IICB and Dr C. Bhakta of the Patna University and was awarded Ph.D. degree by the Patna University for his thesis based on these studies. □

Synthetic studies in the chemistry of carbonyl complexes of ruthenium, rhodium and iridium

Shri Joseph Kuruvilla while working at the National Chemical Laboratory, Pune, studied the characteristics and reactions of carbonyl complexes of catalytically active metals such as ruthenium, rhodium and iridium. The reactions of Ru-H and Ru-C1 bonds in RuHCICO(PPh₃)₃ were studied using bidentate ligands such as β -diketones, aromatic hydroxy aldehydes or ketones. Two series of products were obtained with the general formula RuCICO (PPh₃)₂L and RuH(CO)

(PPh₃)₂L. A new route for the preparation of stable alkyl ruthenium complexes was developed by the insertion reaction of a carbonyl activated olefin such as methylacrylate with ruthenium hydrido complex, RuHCICO (PPh₃)₃ giving RuCICO (PPh₃)₂ (CH₂ CH₂COOCH₃). Azines and hydrazones were reacted with RuCl₂ (PPh₃)₃ giving penta-coordinated Ru (II) complexes of the general formula Ru (PPh₃)₂L. Ruthenium carbonyl complexes such as Ru(CO)₂L₂ were prepared from bidentate ligands and RuCl₂ (CO)₂ square planar complexes such as RhCOCI(PPh₃)₂ and IrCICO (PPh₃)₂ were reacted with bidentate ligands to yield Rh(I) and Ir(I) penta coordinated complexes.

All these new products are expected to be active homogeneous catalysts.

Shri Kuruvilla carried out these studies under the guidance of Dr C. Gopinathan and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

Synthesis of some biologically active compounds

Ms Kamini Garyali while working at the National Chemical Laboratory, Pune, synthesized some biologically active compounds. Through the synthesis of R(+)- α lipoic acid, a biologically active molecule of great potential in medical use, she studied the different ways by which a problem of asymmetric synthesis can be solved. These solutions are found by selection of an abundant natural material as a chiral starting material (D-glucose). D-glucose was converted to the title compound in a highly efficient synthetic sequence.

An extremely efficient chiral reagent (Sharpless asymmetric reagent) was used to produce enantioselectively the required intermediate which was used for the synthesis of the title compound or for the generation of a chiral synthon like 1, 2R, 4-butanediol from a natural material and finally, by using it to synthesize the asymmetric molecule, R(+)- α -lipoic acid.

Ms Garyali investigated the usefulness of a sulphur Witting reaction using ethyldimethylsulfurananylidene acetate, a sulfurane, where the reagent can be easily generated and manipulated for the synthesis of the parent ester of pyrethroids. The applicability of this method in principle to other analogous esters was taken for granted in considering this approach.

Ms Garyali also studied the potential use of zeolites in establishing a dehydration technique in organic synthesis. Nitriles are important organic intermediates for a variety of end products, especially those required in the drug industry. The investigation demonstrated the efficiency of the dehydration reaction over zeolites for different types of amides as well as aldoximes. The applicability of this method was judged by making its use possible for the large scale preparation of isopropyl, 3', 4', benzeneacetonitrile—a key intermediate in the synthesis of verapamil, a coronary vasodilator.

Ms Garyali carried out these studies under the guidance of Dr A.V. Rama Rao and was awarded Ph.D. degree by the University of Poona for her thesis based on these studies. □

Synthesis of some biologically active compounds from carbohydrates

Shri V.J. Patil while working at the National Chemical Laboratory, Pune, carried out the synthesis of biologically active compounds from carbohydrates. Shri Patil synthesized **L**-daunosamine, which is the glycoside component of the anticancer antibiotics, daunomycin and adriamycin. A new synthesis of **L**-daunosamine was carried out starting from commercially available **D**-glucosamine hydrochloride. Similarly, the fluoro analog, 2-fluoro-**L**-daunosamine was also synthesized to evaluate the effect of fluorine substituent for the enhanced antibiotic activity. Noglamycin, an anthracycline antibiotic with a C-glycoside component in its structure, was synthesized via Grignard reaction starting from the sugar,

uloses. Geismann-Weiss lactone, which is a chiral precursor for the synthesis of pyrolozidine alkaloids, viz. retene, crotanecine, was synthesized in an optically active form from **D**-glucofuranose for the first time. Finally, (S)-hydroxyethyl-**r**-butyrolactone which is a chiral building block for the synthesis of **R** (+)-**r**-caplactone, was synthesized starting from diacetone **D**-glucose.

Shri Patil carried out these studies under the guidance of Dr A.V. Rama Rao and was awarded Ph.D. degree by the University of Poona for his thesis based on these studies. □

PROGRESS REPORTS

CFTRI Annual Report: 1985-86

The annual report of the Central Food Technological Research Institute (CFTRI), Mysore, for the year 1985-86, shows that the institute made available for commercial utilization technologies for processing or manufacturing of 24 food products to 165 entrepreneurs during 1985-86. Six processes concerned with the production of full-flavoured Bangalore blue grape juice concentrate, continuous production of jams and jellies, chemical stabilization of rice bran, production of jowar flakes, *papad* press and annatto dye, were ready for commercial utilization.

CFTRI assisted the Bihar Fruit and Vegetable Development Corporation in commissioning of a plant at Hajipur for producing fruit products. It rendered assistance to the Gujarat Agro-Industries Corporation in designing a plant with a capacity to process six tonnes of mangoes per hour for production of mango juice concentrate.

Ten new consultancy assignments were taken up and fourteen, including those carried over from the previous year, were completed. These involved preparation of project reports or advisory technical assistance. Eighteen preinvestment reports were prepared covering the manufacture of instant pickles, tatty-fruity and candy, energy food, fungal rennet, fruit juice concentrate, malted beverage, ragi-

based weaning food, instant tea, fruits and vegetable products, baker's yeast, cashew wine/grape brandy, sweetened mango and guava powder, alcohol, snack foods and soft drink beverage powder, canning of fruit juice/pulp, chemical stabilization of rice bran, pineapple processing, and dehydration of ginger.

A techno-economic survey report on agricultural potential and possibilities of setting up agro-based food industries in selected districts of Tamil Nadu was prepared for the Tamil Nadu Agro-Industries Development Corporation.

The institute analyzed over 13,000 samples of processed fruit and vegetable products under the Fruit Products Order of the Government of India to help entrepreneurs maintain quality standards for indigenous production and export. The CFTRI Regional Centre at Bombay analyzed over 4600 samples drawn under Preshipment Inspection Scheme and nearly 4800 samples drawn under the Continuous Inspection Scheme. About 4730 samples of food products were analyzed for quality standards specified under the Prevention of Food Adulteration Act. Over 8600 technical queries were attended to.

CFTRI continued to serve as an active centre for developing human resources to carry forward technology in the developing countries. Besides, a two-year M.Sc. course in Food Technology, in which 21 students participated in 1983-85 batch and 18 students in 1984-86 batch, the institute ran five short-term courses for a total of 75 participants. The courses were on the subjects: fruit and vegetable preservation, grain storage and pest control, soft drink technology, assessment of microbial quality of foods, and included orientation course for the officers of the Community Canning Centres of the Government of India. Training on food preservation was given to 66 university students. Twelve candidates have registered for M.Sc. in food science by research.

The fourth 10-month course in flour milling technology conducted by the International School of Milling Technol-

ogy ended in July 1985, and the sixth one with 20 participants including one each from Nepal and Bangladesh and two from Zambia was in progress. The school ran a two-week course on basics in flour milling, sponsored by US Wheat Associates for officers from central and state government agencies.

Six United Nations University fellows including two from Bangladesh, three from Nigeria and one from Ethiopia joined the institute for advanced level training. Six other UNU fellows, who joined earlier, continued their programme of work. They included two from Indonesia, two from Sudan and one each from Korea and Morocco.

Specialized training was given to representatives of various organizations in India, in addition to foreign nationals from Sri Lanka, Vietnam, Philippines, Guinea, Tanzania and Bangladesh.

Sixteen theses were submitted by members based on their research work under the guidance of CFTRI scientists for the award of Ph.D. degree by the University of Mysore. Eighty-four research papers were published and 99 papers were presented at symposia, conferences and seminars.

NGRI Annual Report: 1985-86

The thrust of the R&D activities of National Geophysical Research Institute (NGRI), Hyderabad, over the next few years would be directed to modelling approaches, location, assessment and management of groundwater, deep seismic soundings and earthquake hazard assessment. This is revealed by the annual report of NGRI for 1985-86. The report also shows that the institute made concerted efforts to ensure that computer programmes for general as well as for interpretational purposes, which were developed or implemented by the institute scientists are available for wider use by scientists from within the institute as well as outside. As a result, 19 such programmes with complete documentation on a standardized format were added during the year. Of the 23 ongoing pro-

jects, two were brought to a conclusion. The group involved in one of these projects also formulated a new programme aimed at developing direct detection methods for hydrocarbon exploration, notably through helium, neon and alkane emanometry, for their future activity. A feasibility experiment was also carried out during the year towards developing a general capability for seismic tomography of a given region using teleseismic relative residuals.

Another significant achievement during the year was the discovery of a new diamond bearing kimberlite in the Wajarkarur region of Andhra Pradesh, following an integrated system of exploration in which sampling stream sediments for indicator minerals was used as the primary search tool, and geophysical, geological, landsat and air-photo data as conceptual guides. The importance of this discovery lies in the demonstration of the fact that, contrary to earlier belief, it should be possible to discover more kimberlites using this new technique. Kimberlites are the only primary sources of all natural diamonds and constitute the deepest available samples of rock from the earth's mantle.

The new deep seismic sounding work along the Thuadara-Sendhwa-Sindad profile, transverse to the Narmada-Son lineament revealed the presence of a sedimentary layer which has a maximum thickness of 1.8 km under 900m of Deccan Traps. This shows that the 1.7 km thick sedimentary formation underlying 400m of traps, which was delineated earlier along an eastern sub parallel profile, extends westwards under a thickening overburden of Deccan basalts. This sedimentary basin thus appears to be fairly extensive and may contain promising hydrocarbon prospects.

The aeromagnetic map of the Cuddapah basin and the adjoining crystallines prepared by NGRI brought out many unknown lineaments which are not discernible in air-photos or landsat images. Some of these represent large scale faults in the granite-gneiss terrain

continuing into the area covered by the Cuddapah sediments, indicating that this area was subjected to large crustal compressive and tensional stresses in the early Proterozoic. Many of these faults must be planes of weakness where groundwater may be tapped. Some of these were found to be associated with the occurrence of kimberlite in this area, and these faults may well have controlled such emplacements.

Analysis of geomagnetic observatory data and of those generated during the 1979-80 magnetometer array experiments in the southern peninsular region, have led to the delineation of an offshore crustal conductor at a depth of 30 km, in the Palk Strait, and at 12 km beneath the Comorin ridge. A thick midcrustal conductive layer was also delineated beneath Choutuppal—60 km from Hyderabad—at a depth of 16 km using geoelectric and ultra quick-run pulsation data. Further, a five km thick subcrustal conductive layer of about 200 ohm-m resistivity was delineated under the region adjacent to the southwestern region of the Cuddapah basin, using magnetotelluric investigations.

The unusually high nickel and chromium abundances in the clastic sedimentary rocks (greywackes) from the Dharwar craton, suggest a significant ultramafic component. Their overall chemical makeup is best modeled by a mixture of preexisting Archaean mafic volcanics, sodium rich plutonic rocks like tonalites, trondhjemites and felsic volcanics in variable proportions. The europium anomaly shown by some of the rocks is in marked contrast with the absence of such anomalies in other Archaean terrains of the world, reflecting chemical fractionation during sedimentation.

Further studies of the granulites of northern Tamil Nadu which represent lower crustal rocks of the Archaean era and have features typical of Archaean granulite terrains worldwide, revealed that the terrain is dominated by tonalite-trondhjemite with lesser amounts of meta-sediment, mafic gneiss, anorthosite and

granite. Maximum pressure-temperature estimates based on mineral equilibrium calculations were found to be 5-7 kbars and 700-800°C—very similar to estimates for other transition zones in the craton.

Analysis of sea level fluctuations over the past 570 m.y. yielded four dominant periodicities of 143, 71, 44 and 32 m.y. These periods which match those of geomagnetic field reversals obtained earlier are equally well correlated with the dominant periodic motions of the solar system in the Milkyway galaxy. Such a strong correlation between sea level fluctuations and geomagnetic reversals with galactic motions points to significant relations between the style of geological and biological evolution.

A joint inversion of satellite magnetic (MAGSAT) and free-air gravity data revealed a 1500 km long ridge like structure below central India, trending NW-SE and extending from the Aravallis to the Godavari basin, possibly formed as a consequence of collision of the Indian land-mass with Eurasia.

A structural model of the region around the Indian Antarctica Station was formulated based on interpretation of the multiparameter geophysical exploration carried out by the institute during the fourth expedition. According to this model, the station is located on top of an approximately 400m thick ice sheet which is floating over a 1850m deep submarine valley. The model successfully explains the exceptionally slow drift rate of the region and provides clues to the formation of water channels found there.

Another in-situ measurement made in a borehole at Malanjhand (M.P.) up to a depth of 375m showed that the direction of the maximum principal stress is oriented along N70°E.

Upon computerized reinterpretation of pump test data in the Neyveli aquifer towards designing optimal schemes for groundwater withdrawal, it was discovered that there is a significant vertical flow, contrary to hitherto held concepts. The result has led to new endeavours and design of appropriate experiments to resolve this question.

A computer program was developed for automatic interpretation of electromagnetic data obtained from parametric or geometric soundings using a horizontal loop source of current and a vertical magnetic receiver.

A number of challenging problems posed and sponsored by various agencies were tackled by the institute. Three major projects were completed during the year and three new ones undertaken. A sum of Rs 95.45 lakh was received on account of these projects.

Seventeen technical reports were prepared and 58 papers were published, 59 papers were presented in various symposia/seminars. □

NEW PUBLICATIONS

Modern Techniques in High Resolution FT NMR

The title publication deals with modern high resolution NMR; it gives an exposition of the fundamentals of NMR and develops a simple density operator treatment which is then uniformly employed, permitting a comprehensive description of diverse NMR experiments. This sound understanding of the basis of novel experiments is reinforced by practical examples from the recent literature which demonstrate their power in research applications. Topics covered include General theory, One dimensional experiments on liquids, Coherence transfer, Two dimensional experiments on liquids, Multiple quantum spectroscopy, 1D and 2D High resolution NMR of solids, Composite pulses and Topical imaging. The book also contains a set of appendices on Matrix and Commutator algebra, Fourier transformation, Dipolar relaxation, Average Hamiltonian theory and irreducible tensor methods. The book is meant for graduate students as well as for researchers who make extensive use of NMR in their work.

The publication (authors: Dr N. Chandrakumar, Scientist, Chemical Physics Group, Central Leather Research Institute, Madras; and Dr S. Subramanian, currently in USA) has been published by Springer-Verlag, New York. □

DEPUTATION BRIEFS

Shri M.M. Krishnaiah

Shri M.M. Krishnaiah, Head, International School of Milling Technology and Coordinator, Baking Technology Discipline, Central Food Technological Research Institute (CFTRI), Mysore, visited USA during 2-15 August 1986. This was in connection with attending a short course on milling organized by the International Grains Programme, Kansas State University, Kansas, Manhattan, USA. The programme was sponsored by U.S. Wheat Associates, New Delhi. The programme and visits to flour mills and other ancillary units have been helpful to reorient the programmes at the International School of Milling Technology.

Dr S.C. Basappa

Dr S.C. Basappa, Scientist, Discipline of Microbiology, Central Food Technological Research Institute (CFTRI), Mysore, was deputed to France for two months from 14 April 1986. He studied the R&D status of fermentation technology and relative merits of various approaches made in this area, feasibility of technologies developed in France for their application in India and new technologies associated with the alternative sources of energy, including modern genetic engineering techniques in improving microbial strains for augmenting bioenergy and food.

In the first phase of his programme, Dr Basappa worked with Prof. J.C. Barath in the CNRS Laboratoire de Chimie Bactérienne, on induction of thermotolerant mutants of *Zymomonas mobilis* in continuous culture for production of ethanol. N-methyl-N'-nitro-N-nitrosoguanidin (NTG) as well as thermal shock (55°C) were employed and 92 large colonies suspected to be mutants were isolated and tested for both rate of growth and ethanol production at 42°C as compared to wild type. Among these, only one was found to be better than the wild type. Further characterization of these isolates is underway in the above laboratory.

Dr Basappa visited various laboratories engaged in several aspects of bio-

technology: CNRS Laboratoire de Chimie Bacterienne, Marseille, INRA Chaire de genetique et de microbiologie, Montpellier, INRA Station de genie microbiologique, Dijon, CNRS Institute Jacques Monod, Paris, Institute of Pasteur, Paris and Institute of Pasteur, Lille (Nord), in order to gather information on the status of fermentation technology and microbiology in France. According to him work on the conversion of starch and cellulosic materials to glucose and ethanol was being carried out in France.

Basic genetic engineering work on the transfer of cellulase and amylase genes into *Z.mobilis* and *S.cerevisiae* for a single step fermentation was being carried out. Lot of pioneering research work had been carried out on the production of single cell proteins from various raw materials and the country is in a position to offer turnkey technology in this area. Microbial conversion of nitrites to amino acids, methanogenic and nitrogen fixing bacteria, microbial refining of edible oils, genetic improvement of brewer's yeast, immunology, food-borne infections and intoxications and microbial amelioration of soils are the present topics of interest.

Some companies have developed technology for solid state fermentation of garbage for biogas and are willing to transfer the technology to others. □

CONFERENCE BRIEFS

International Seminar on Modern Food Processing Technology

Shri T.R. Prabhu of the Industrial Development and Consultancy Services, Central Food Technological Research Institute (CFTRI), Mysore, participated in the title seminar sponsored by the Asian Productivity Organization, Tokyo and organized by the Hongkong Productivity Council, Hongkong, during 1-5 September 1986. He presented a paper entitled 'Status of Food Processing Industry of India' which highlighted the present situation of food industries and major factors affecting the growth and productivity of the food service industry. Twenty-

seven persons from 12 member countries, viz. India, Nepal, Sri Lanka, Indonesia, Malaysia, Singapore, Hongkong, Republic of China, Philippines, Thailand, Korea and Tonga, participated in the seminar whose objective was to enable the participants to learn modern technologies in food processing and understand the key economic and technological problems facing the industry so that they can identify and develop the technologies suitable to their countries' resources and needs. The seminar was through lectures by international experts in the field, audio-visual and video presentations, discussions and visits to four food processing units. It also gave an opportunity to the participants to gain an up-to-date information on the state-of-art, and to have mutual interaction on the developments taking place in various countries of the Asian Region. □

TRAINING COURSES

Environmental Management

The National Environmental Engineering Research Institute (NEERI), Nagpur, conducted a twelve-day training course in Environmental Management, starting from 10 November 1986. Sixteen scientists/engineers of the Oil and Natural Gas Commission (ONGC), Dehra Dun participated.

Prof. K.J. Nath, Head, Department of Sanitary Engineering, All India Institute of Hygiene and Public Health, Calcutta, in his inaugural address emphasized the need for better environmental management to control the growing problem of pollution in wake of the rapid industrial development in India.

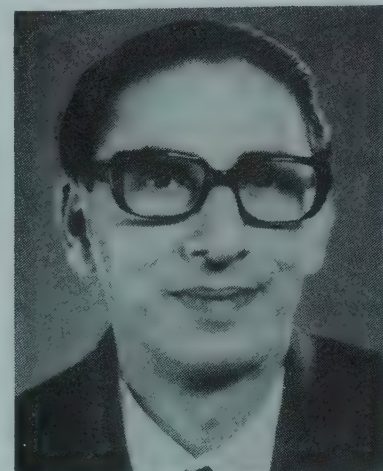
Shri K.R. Bulusu, Acting Director, NEERI, outlined the efforts being made by NEERI to assist many core sector industries in India to control pollution by meeting their specific needs through such training programmes. He was confident that NEERI would be able to assist ONGC in meeting some of its futuristic needs by such collaborative efforts to contain and control pollution. □

PERSONNEL NEWS

Appointments/Promotions

Shri B.P. Chaliha promoted as Scientist G

Shri B.P. Chaliha of the Regional Research Laboratory (RRL), Jorhat, has been promoted as Scientist G with effect from



1 November 1983. Shri Chaliha is the Head of the RRL Jorhat's Paper & Board Division.

For an account of Shri Chaliha's scientific contributions, see *CSIR News*, 36 (1986), 182.



At the Regional Research Laboratory, Jammu, the following personnel have been promoted on assessment with effect from the dates given in parentheses :

As Scientist C

Shri J.C. Kohli (26 June 1985)

As Scientist B

Dr V.K. Gupta (1 Jan. 1984) and Shri R.K. Sahdev (24 Dec. 1984).



At the National Metallurgical Laboratory (NML), Jamshedpur, the following personnel have been promoted on assessment as Scientists EII, with effect from the dates given in parentheses : Shri A.P. Chowdhury (1 April 1984), Dr P. Prabhakaran (Oct. 1984) and Shri P.C. Sen (1 Dec. 1984).

Brief profiles of the Scientists are given below :

Shri A.P. Chowdhury

Shri Chowdhury (born August 1926) obtained his M.Sc. (Physics) degree

from Lucknow University (1948) and three years post-graduate diploma (D.I.I.Sc) from the Indian Institute of Science, Bangalore (1951) in Electrical Communication Engineering.

Shri Chowdhury joined NML on 24 September 1954 as Senior Scientific Officer(Electronics Engineer) after serving two years in Technical Development Establishment (Instrument and Electronics), Defence Research Organisation, Ministry of Defence, Dehra Dun. He organized Electronics Division for development, maintenance, calibration, installation of various types of electronic and process control instruments (including sophisticated instruments such as SEM, TEM, AAS, XRD, XRF, DTS and DRA etc.).

He was a Colombo Plan Fellow in U.K. in 1960, under the Technical Cooperation Scheme and took training in Electronic Instrumentation. Shri Chowdhury is a Fellow of the Institution of Engineers (India), and of the Institution of Instrumentation Scientists and Technologists (India). He has presented papers on various topics on instrumentation in international and national symposia and conferences. He has two patents and about fifteen papers to his credit.

Dr P. Prabhakaran

Dr P. Prabhakaran (born 26 Nov. 1926) did his M.Sc. (Chemistry) from the Banaras Hindu University in 1951 and joined NML in 1953 after serving for a shortwhile as a Lecturer in a college in Andhra Pradesh. He took his Ph.D. degree (Chemistry-Silicate Technology) from the Banaras Hindu University in 1964 based on his work on 'Ion-exchange of clays and effect of cations on thermal transformation of kaolinite' carried out at NML. He visited FRG on deputation during 1966-67 and worked at the Institute of Chemical Technology, University of Karlsruhe, Karlsruhe, under the programme of 2nd International

Seminar in Physical Chemistry and Chemical Engineering. During his stay at Karlsruhe, he worked on siliconizing of tantalum and phase transformations in Ta/TaSi₂ system under Prof E. Fitzer.

Dr Prabhakaran has worked on varied subjects such as clays, carbon aggregates, soderberg paste, etc. and made considerable contributions in the area of protective coatings in recent years. His interests vary from organic coatings, diffusion coatings and zinc rich primers for protection of steel under different environments. He is currently heading the Coating and Electroplating group at NML. He is author of twenty papers and five patents and is Fellow of the Electrochemical Society of India and of the Society for Advancement of Electrochemical Science and Technology (SAEST).

Shri P.C. Sen

Shri P.C. Sen (born 1 Dec. 1926) took his degree in Science and Ceramic Technology from the Calcutta University and qualified himself as C. Engg. He did MIM from the Institution of Metallurgists, London.

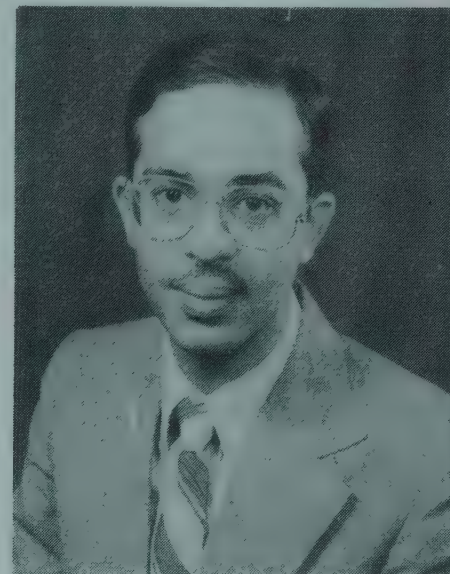
Joining NML in 1951, he has worked on various R&D projects in Refractories Division of NML and has about 100 published research papers and reports, and 4 patents to his credit. He has been responsible for transfer of the technical know-how on graphite-silicon carbide crucibles. He has visited East Germany on Indo-GDR Bilateral exchange programme and he is the secretary of the Indian Ceramic Society, Jamshedpur Chapter, for the last few years and has been actively engaged in organizing seminar, get-together and refresher courses in ceramics under the joint auspices of NML and the Indian Ceramic Society, Jamshedpur Chapter.

He has represented NML in various meetings and committees of ISI, DGTD, etc. He is a Member of the Indian Science Congress Association and a Fellow Member of the Indian Thermal Analysis Society. □

Honours & Awards

Dr Ravi Mehrotra

Dr Ravi Mehrotra, Scientist C, National Physical Laboratory, New Delhi, has been selected as a 'Young Associate' of the Indian Academy of Sciences. The 'Young Associates' scheme was initiated by the academy in 1983 to encourage talent among the young scientists in the coun-



try. Under this scheme, the academy selects young scientists below the age of 35 years to be associated with the academy in its various activities.

Also, Dr Ravi Mehrotra has been awarded the Indian National Science Academy (INSA) Medal for the Young Scientists for the year 1986. INSA medals are given to scientists below the age of 32 years, in recognition of their achievements in any branch of science and technology within the purview of the academy. The award carries a cash prize of Rs 5000, a medal and a citation. Dr Mehrotra has received this award for his work done after joining NPL in 1983, especially for the theoretical studies of viscoelastic effects in a two dimensional electron liquid, prediction of existence of shear waves in a 2D electron liquid and some experimental studies on Quantum Hall Effect.

Dr G. Thyagarajan

Dr G. Thyagarajan, Director, Central Leather Research Institute, Madras, has been nominated by the Government of Punjab, as a Member of the Punjab State Council for Science and Technology.

Shri S. Panchapakesan

Shri S. Panchapakesan of the National Aeronautical Laboratory, Bangalore, has become a Senior Member of the Computer Society of India, following the upgradation of his institutional membership through NAL.

Dr K.N. Raju

Dr K.N. Raju of the Materials Science Division, National Aeronautical Laboratory, Bangalore, has been nominated to the Editorial Advisory Board of *Computational Mechanics*, the international journal published by Springer-Verlag.

Shri Dilip M. Salwi gets Sanskriti Award

Shri Dilip M. Salwi, one of the Editors of *Science Reporter*, has been awarded the 1986 Sanskriti Award for his contributions to science journalism. Instituted by the Sanskriti Pratisthan, New Delhi, the award is given every year to young people of Delhi below 35 years of age in five different fields. It carries a cash prize of Rs 5000 and a citation plaque with an additional complementary grant of Rs 5000 for conducting a project of interest to the awardee. Thirty-four year old Salwi has to date written more than 600 articles on various aspects of science and

technology in reputed magazines and dailies and has also authored six books aimed at children. Earlier, two of his books *Our Scientists* and *A Passage to Antarctica* won the Children's Book Trust Prizes in 1983 and 1985 respectively.

Dr A.G. Dutta

Dr A.G. Dutta, Scientist (Director's grade), Indian Institute of Chemical Biology, Calcutta, has been nominated as a member of the reconstituted Editorial Board for Proceedings of the Indian National Science Academy, Part B (Biological Sciences) for 1987. □

PATENTS FILED

796/DEL/86: A process for the production of chromium manganese-nitrogen-carbon-tungsten-molybdenum creep resistant steel, Kanhaiya Prasad, Raghubir Singh and R. Kumar—National Metallurgical Laboratory, Jamshedpur.

514/DEL/86: A device for automatic uninterrupted single phase power supply from a three phase power supply source, R.N. Roy—Indian Institute of Petroleum, Dehra Dun.

515/DEL/86: Multi strain gauge pore water pressure cell, T.K. S. Natarajan, B. Malhotra, S.K. Bhaskar and S. Ranga-

nathan—Central Road Research Institute, New Delhi.

572/DEL/86: An in-situ electropolymerization process for the preparation of polyphenylene oxide, M.T. Vijayan, S. Pitchumani and V. Krishnan—Central Electrochemical Research Institute, Karaikudi.

370/DEL/86: A process for the preparation of 1-formyl-4-appropriately substituted piperazines useful as male fertility regulating agents, N.M. Khanna, A.K. Dwivedi, J.P.S. Sarin, Archana Srivastava & B.S. Setty—Central Drug Research Institute, Lucknow.

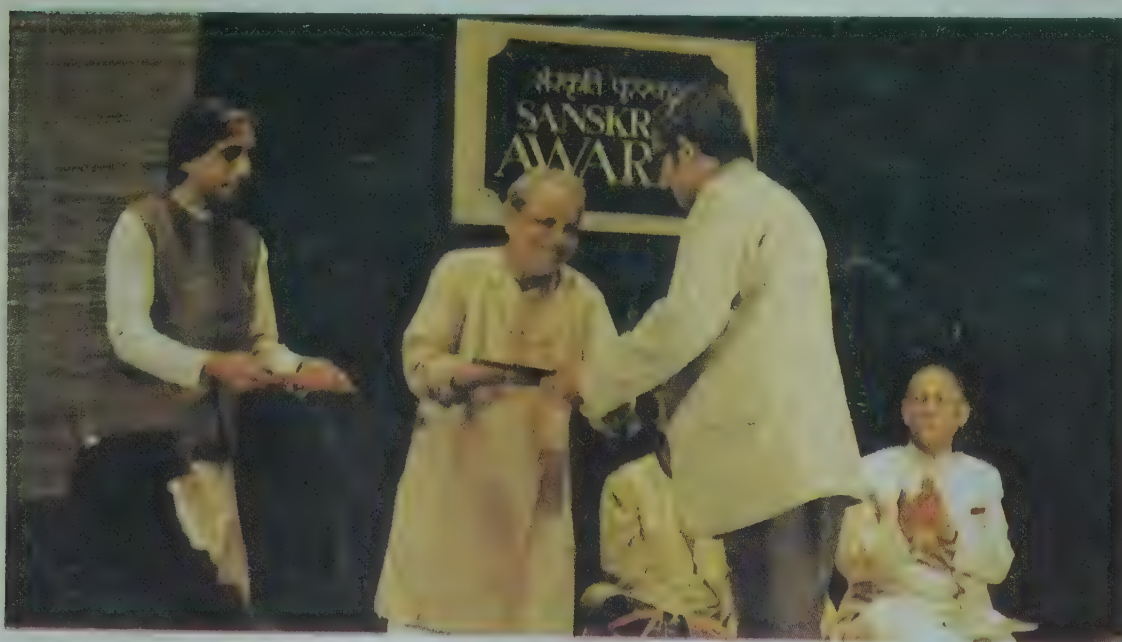
663/DEL/86: Improved electrolytic cell for the production of calcium gluconate, K.S. Udupa, P. Subbiah, K. Jayaraman, P. Thirunavukkarasu and C. Seshadri—Central Electrochemical Research Institute, Karaikudi. □

ANNOUNCEMENTS

National Seminar on AC Motor Drives for Transportation and Industrial Applications

The Central Electronics Engineering Research Institute (CEERI), Pilani, is organizing the title seminar in collaboration with the Department of Electronics. The seminar will be held during 15-17 April 1987 at CEERI. Main objective of the proposed seminar is to establish close interaction and coordination between organizations responsible for the growth and development of AC motor drives for transportation and industrial applications. Papers in the form of original contributions and review papers are invited in any of the following fields related to AC motor drives: PWM generation techniques; Inverter power circuits, power drives; Feedback control techniques; Adaptive control strategies; Loss minimization in PWM; Special purpose ISI/VLSI/hybrid micro circuits, and industrial experiences.

Further details regarding the seminar can be had from: The Director, CEERI, Pilani 333031. □



Shri Dilip M. Salwi receiving the 1986 Sanskriti Award from the noted classical singer Kumar Gandharva at the ceremony held at Kamani Auditorium, New Delhi



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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